

THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY

ADVISORY EDITORIAL BOARD

CHANNING W. BARRETT
C. L. BONIFIELD
J. WESLEY BOVÉE
W. W. CHIPMAN
JOHN G. CLARK
H. S. CROSSEN
THOMAS CULLEN
EDWARD P. DAVIS
J. B. DELEE
ROBERT L. DICKINSON
PALMER FINDLEY
ROBERT T. FRANK

GEORGE GELLHORN
ALBERT GOLDSPOHN
WILLIAM P. GRAVES
HERMAN E. HAYD
BARTON C. HIRST
E. J. ILL
J. C. LITZENBERG
F. W. LYNCH
FRANKLIN H. MARTIN
C. JEFF MILLER
GEORGE CLARK MOSHER
HENRY P. NEWMAN

GEO. H. NOBLE
REUBEN PETERSON
JOHN OSBORN POLAK
F. F. SIMPSON
HENRY SCHWARZ
J. M. SLEMONS
HOWARD C. TAYLOR
THOMAS J. WATKINS
B. P. WAYSON
GEORGE GRAY WARD
J. WHITRIDGE WILLIAMS

OFFICIAL ORGAN OF

THE AMERICAN GYNECOLOGICAL SOCIETY

THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS, AND ABDOMINAL SURGEONS
NEW YORK OBSTETRICAL SOCIETY; OBSTETRICAL SOCIETY OF PHILADELPHIA; BROOKLYN GYNECOLOGICAL
SOCIETY; AND ST. LOUIS GYNECOLOGICAL SOCIETY

Editor, GEORGE W. KOSMAK
Associate Editor, HUGO EHRENFEST

VOLUME VII
JANUARY, 1924—JUNE, 1924

ST. LOUIS
C. V. MOSBY COMPANY

1924

COPYRIGHT, 1924, BY THE C. V. MOSBY COMPANY

Press of
The C. V. Mosby Company
St. Louis, Mo.

The American Journal of Obstetrics and Gynecology

VOL. VII

ST. LOUIS, JANUARY, 1924

No. 1

Original Communications

OVARIAN PREGNANCY, WITH THE REPORT OF A CASE

BY LYLE A. SUTTON, M.D., ALBANY, N. Y.

From the Gynecological and Pathological Departments of the Albany Hospital and Union University (Albany Medical College).

OVARIAN pregnancy is a condition which has been recognized for many years. The number of cases, however, is comparatively small, and there are many points, particularly those regarding the exact location of the pregnancy and why it developed there, that have not and cannot be settled until the entire subject has been more carefully studied. I believe that the following case of ovarian gestation presents some interesting problems regarding the type and the origin of the tissue upon which a fertilized human ovum is likely to develop, and also whether or not all apparently primary ovarian pregnancies originally developed in that organ. The case is from the Service of Dr. John A. Sampson to whom I am indebted for permission to use the clinical records.

The two commonly accepted theories of ovarian gestation are as follows:

1. The spermatozoön enters a graafian follicle through a very small opening before the ovum has been discharged, and this aperture may, or may not, become closed subsequently.

2. The spermatozoön may enter an old ruptured follicle into which another follicle ruptures, and there fertilize the ovum of the latter (Leopold).¹

We should add to these two theories a third, namely, that a pregnancy situated in the ovary may have been primarily in the tube. Tubal abortion might permit the ovum to escape through the tube into the ovary where it is retained, thus appearing as a primary ovarian pregnancy.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

The majority of observers believe that ovarian gestation usually occurs in a graafian follicle, and some, notably Ray,² state that it cannot occur in any other place. On the other hand, Webster³ maintains that the pregnancy can only develop in tissue of müllerian type. There is much evidence in favor of both views, and of the latter probably much more than has been generally recognized.

Uterine pregnancy has occurred in women having only an ovary on one side and a tube on the other, in which case the ovum must have traversed the peritoneal cavity. Spermatozoa no doubt pass through the fallopian tubes into the peritoneal cavity, as they are sometimes found in the routine microscopic examination of the tubes. Should an ovum, then, be fertilized in the peritoneal cavity there is the possibility of its becoming implanted somewhere in the pelvic cavity. This is known to occur, as pregnancy has developed on detached pieces of fimbriae adherent to pelvic structures, and also on the surface of the ovary itself. The changes in the mucous membrane of the tubes and the adhesions about them due to salpingitis may retard the progress of the ovum, and are considered important factors in the etiology of most types of ectopic gestation.

I was unable to find any structures in the wall of the ovarian hematoma in our case which might suggest that the pregnancy had occurred in a graafian follicle. Similar findings have been reported by several writers, notably Thompson,⁴ Franz,⁵ Webster,³ Hewetson-Lloyd,⁶ Bryce, Teacher, and Kerr,⁷ Hunter,⁸ Chiene,⁹ and Holland,¹⁰ making a total of at least nine authentic cases of ovarian pregnancy that have occurred outside of a graafian follicle. In none of the cases reported has the gestation sac been completely surrounded by a corpus luteum, although lutein cells have often been found in the wall of an ovarian hematoma, and might be considered as strong circumstantial evidence that the pregnancy had developed in a graafian follicle. However, a pregnancy developing anywhere in an ovary might, in the course of its growth, encroach upon or rupture into a graafian follicle, thus making the latter a part of the general gestation sac, and giving the appearance of its having originated in the follicle. Ray² accounts for a pregnancy outside the follicle as an attempt on the part of the ovum to find a more suitable bed for its implantation. He states that it first becomes embedded in the corpus luteum, but since the connective tissue layer just outside is more favorable for its growth it burrows out into this layer, and apparently loses its connection with the follicle.

A decidual reaction is thought by some to be necessary for the implantation of the ovum. The outer layers of a fertilized ovum possess the inherent property of dissolving or digesting the tissues with which they come into immediate contact, thus forming a pit into which the ovum burrows. This procedure opens up small blood vessels, and the ovum throws out villi which develop trophoblastic and plasmoblastic

layers. A true decidual reaction is not necessary, but acts rather to limit the growth until placentation is complete. It would seem, then, that a fertilized ovum can become implanted on any tissue which offers the proper soil. Pregnancy normally occurs in tissue of müllerian type which, wherever present, offers certain genetic advantages over other kinds of tissue as a nidus for the ovum. It only remains, then, to prove the presence of müllerian tissue in the ovary to strongly suggest a fourth theory of the origin of ovarian pregnancy. This point will be more fully discussed later. While fertilization *in situ* cannot be denied, and in fact Stratz¹¹ has demonstrated the entrance of spermatozoa into a ruptured follicle in the ovary of a Sorex, nevertheless, in view of the conditions found in many cases, an extrafollicular implantation of some type must be considered.

The criteria on which to base a diagnosis of ovarian pregnancy are essentially those stated by Spiegelberg¹² in 1887:

1. The tube on the side of the pregnancy must be intact.
2. The fetal sac must occupy the position of the ovary.
3. The ovary must be connected with the uterus by the uteroovarian ligament.
4. Definite ovarian tissue must be found in the wall of the sac; (modified by Williams,¹³ so that the wall must contain ovarian tissue in several places).

Other less imperative requirements have also been suggested:

1. The embryo must be visible in the cavity of the gestation sac (Jacobson, 1908).¹⁴ In pregnancies of sufficient duration the embryo can be found, but in the majority of cases the pregnancy is terminated at an early date and the embryo rapidly disintegrates, being finally represented by an amorphous mass, or is lost entirely by early rupture of the gestation sac. An embryo was not found in 24 of the 43 cases reviewed by Hunter.⁸

2. There must be placental tissue within the ovarian stroma (Heincken).¹⁵

3. The tube must not only be intact but free from any evidence of gestation, (Norris).¹⁶

It has been observed by several writers that in ovarian pregnancy a decidual reaction may occur in the tube of the corresponding side, and also in the uterus as may be seen in any other type of ectopic gestation. Norris¹⁶ states that the uterine decidua is usually expelled through the cervix shortly after the death of the embryo. Decidua-like changes have been noted in almost every region of the body during pregnancy, hence a decidual reaction in the corresponding tube is not of as much importance as has been ascribed to it. The general trend of opinion, however, is to make the criteria less and less exacting. Whitehouse¹⁷ based his case of ovarian pregnancy on the presence of plasmodio-trophoblastic tissue, without villi, in the walls of an ovarian hematoma. The first four requisites, however, are generally accepted and it remains for future investigators to determine just what criteria are absolutely necessary.

These considerations make it difficult to estimate correctly the total number of authentic cases. The writer has reviewed those published, and feels that there can safely be included the 19 cases accepted by

Norris,¹⁶ and the 22 added by Lockyer,¹⁸ and would add the cases of Meyer and Wynne,¹⁹ Lieb,²⁰ Ray,² Fallon,²¹ Chalfant,²² and Hunter,⁵ making a total of 47. Seventy-two cases have been reported from 1909-1922 inclusive, and among them are some which no doubt should be placed in the accepted list, but cannot be admitted because of insufficient data or lack of microscopic examination.

CASE HISTORY

Mrs. H., aged 27 years, an American housewife, white, was admitted to the Albany Hospital on Sept. 25, 1922.

Chief Complaint.—Pain in the abdomen, particularly on the right side, which had increased in severity since its onset July 6th, 1922; also pain on urination and defecation, and a bloody leucorrheal discharge.

Past History.—The patient's general health has been poor for the past five years. In 1913 she had her first attack of abdominal pain which was more marked on the right side, and was thought to be due to appendicitis. Since then she has had four or five attacks of pain in the lower abdomen, which were accompanied by pain on urination and defecation, leading to a diagnosis of pelvic inflammatory disease. A persistent leucorrheal discharge has been present since 1915.

Menstrual History.—The menstruation began at 18 years, and was always regular, occurring every twenty-eight days. It was painful and profuse for the first two or three days, and accompanied by pressure and "bearing down" sensations. The duration of the flow was from four to five days. The patient had never been pregnant although married five years.

Present Illness.—On April 20, 1922, the last normal menstrual period occurred. May 26, menstruation started and was not normal, being more excessive, accompanied by nausea and vomiting, and with more pain and "bearing down" sensations than usual. Her physician told her at that time that she might be pregnant, and possibly might abort. During the month of June she missed her period entirely.

On July 6, she was suddenly seized with sharp pains in the lower abdomen, more marked on the right side. She went to bed immediately, but the pain so increased in severity that it required repeated injections of morphine to control it. The next day she felt better but the soreness and tenderness in the lower right quadrant persisted, and this soreness progressively increased until her next menstrual period. A small amount of bloody leucorrheal discharge was present.

On July 27, her next menstrual period occurred, which she says was brought on by washing clothes in a tub. The total amount of blood lost was about normal. This period was not accompanied by nausea and pain, but following the flow, pain developed in the lower right quadrant and became more severe than ever before, coming often in paroxysms lasting three to four hours, and requiring hot packs and anodynes to control it.

On Aug. 15, the pain on urination and defecation became so severe that she again consulted her physician who confined her to bed. Three days later during the night she was seized with pain in the lower end of the spine and shortly afterward began to flow, continuing about five hours and saturating two napkins. This was the only evidence of menstruation during August. The pain on urination and defecation, and the bloody leucorrheal discharge were still present.

Sept. 15, menstruation occurred again and was practically normal.

Sept. 18, the patient on getting out of bed, said that she felt a slight fullness

with tenderness in her right side. She was admitted to the Albany Hospital seven days later.

Examination showed a small, well developed, but rather poorly nourished woman. The abdomen was not distended but was quite generally tender, particularly in the lower right quadrant. No masses were palpable in the abdomen. The cervix was smooth, hard, and normal in size and position; likewise the uterus. On the right side, and partially filling the culdesac, was a doughy mass about the size of an orange which apparently had no direct connection with the uterus.

Clinical Diagnosis.—Right tubal pregnancy with a hematocele in the culdesac.

The patient was operated upon Sept. 27, 1922, by Dr. John A. Sampson, through a mid-line incision, and the appendix first removed. The culdesac was filled with a large mass involving the right ovary, surrounded by old blood and many blood stained adhesions. The left tube and ovary were also enveloped in numerous adhesions. There was no free blood in the pelvic cavity. A panhysterectomy and bilateral salpingoophorectomy were done.

The patient made an uneventful recovery and was discharged from the Albany Hospital on Oct. 18th, 1922.

DESCRIPTION OF THE SPECIMEN REMOVED

The specimen consists of the uterus and adnexa (Fig. 1). The cervix is smooth and regular, the external os slightly patulous, and on section is patent throughout. The uterus measures 5.5 cm. x 5 cm. x 3.5 cm. It is smooth, firm and contains



Fig. 1.—Right ovarian pregnancy, posterior view of the uterus, tubes and ovaries (X 1/2). The right ovary is replaced by a hematoma (attached to the uterus by the uteroovarian ligament) in the center of which is situated a gestation sac (see Fig. 2). The distal portion of the right tube is densely adherent to the superior surface of the ovarian hematoma. The left tube is sealed and covered with adhesions.

no palpable tumor masses. A few adhesions are present on the posterior surface where the surrounding structures had been attached. On section the uterine wall varies from 1.5 to 1.7 cm. in thickness. The endometrium is quite hyperplastic and measures 3 to 5 mm. in thickness.

The left tube is 9 cm. long and gradually increases in size as it approaches the fimbriated extremity, and ends in a sealed bulbous mass measuring 2 cm. x 3 cm. x 2 cm. This mass is bound to the ovary by numerous adhesions. The remainder of the tube is also reddened, roughened, and covered by fibrous adhesions. The sealed fimbriated extremity is roughly oval in shape, and spongy. On section it presents a honeycombed appearance with spaces varying in size from 1 to 5 mm. in diameter, which have been formed into irregular shapes by fibrous connective tissue septa of varying thickness. These spaces are filled with a small amount of clear mucoid material and are lined with a smooth glistening membrane. The lumen

of the tube is patent, although nearly occluded at its proximal end. It contains no macroscopic blood. Its walls are definitely thickened throughout.

The left ovary measures 4.5 cm. x 4 cm. x 2.5 cm. It is cystic and covered by blood stained fibrous adhesions. On section it is composed chiefly of one large and numerous smaller cysts filled with clear fluid.

The right tube is 10 cm. long, and approximately 3 cm. from the uterus it becomes continuous with a large roughly oval mass measuring 10 cm. x 6.5 cm. x 6.5 cm. The tube can be followed as a distinct ridge along the anterior curvature of this mass for a distance of 4 cm., where the fimbriae are spread out over its anterior superior surface. The mass occupied the position of the right ovary, and is attached to the uterus by the ovarian ligament. The mass is partially covered by blood-stained adhesions, and is doughy and fluctuant. There are numerous cystic areas varying in size from 1 to 4 cm. in diameter, and which protrude 2 to 5 mm. above the general outline of the mass. The wall is very thin over these areas and transmits the color of a dark chocolate colored fluid. There is a small perforation 5

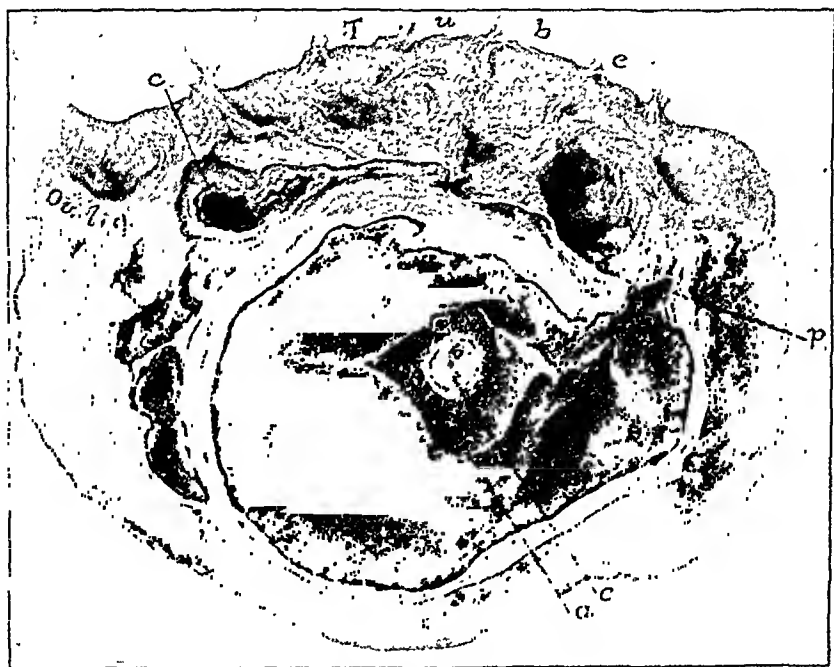


Fig. 2.—Frontal section through the ovarian hematoma showing the gestation sac (a) and the remains of the embryo (c) (X 5/6). The perforation of the hematoma is indicated at (p), and a corpus luteum at (c). The cavity of the latter does not communicate with the cavity of the large ovarian hematoma.

mm. in diameter on the posterolateral surface of the mass, through which dark bloody fluid is escaping.

The entire specimen was hardened in formalin and frontal sections 1 to 2 cm. thick were made of the right ovarian hematoma. The cut surface of Section I, (2 cm. thick) cut from the posterior surface (Fig. 2.) shows the wall of a cyst 2 to 4 mm. in thickness. At the outer anterior pole of this section there is a perforation 8 mm. x 5 mm., filled with dark clotted blood. In the median anterior and superior poles, and lying apparently in intimate connection with the wall of the cyst is what appears to be a corpus luteum 1.5 cm. x 0.4 cm. x 0.8 cm., with some hemorrhage and a blood clot in its central portion. This blood clot is partially surrounded on its medial and anterior surfaces by fibrous tissue containing here and there small amounts of orange yellow pigment.

The cavity of the large cyst is filled with clotted blood. In its upper, anterior

and slightly lateral portion, is a somewhat pentagonal-shaped sac filled with a rather homogeneous reddish brown slightly translucent gelatinous material. In the central portion of this sac is a round, pale body having the dim outlines of an embryo which measures 5 mm. in diameter. This sac seems to be attached along its lateral and superior surfaces to the wall of the hematoma 1 cm. internal to the perforation, by a pedicle 4 mm. in width and 3 mm. in length.

Section II, is 1.2 cm. thick, anterior to Section I. The ovum can no longer be seen, and there is but one large cavity filled with blood clot. The median wall of the hematoma is much thicker than any other portion and contains four discrete cysts varying in size from 3 to 10 mm. The largest lies in apposition to the ovarian ligament.

Section III, is 1.2 cm. thick, anterior to Section II. This section was cut through the fallopian tube (Fig. 3) showing its attachment to the anterior superior aspect of the ovarian hematoma, which at this level also contains only clotted blood. The fimbriae are intimately connected with its lateral anterior superior surface but



Fig. 3.—Retouched photograph (X 5/6) of a frontal section through the fallopian tube showing the relations of the tube to the ovarian hematoma. The fimbriated extremity of the tube is spread out over the superior and lateral surfaces of the ovary, but the lumen of the tube does not communicate with the ovarian hematoma. The pseudofollicular salpingitis is shown.

there is no direct junction between the lumen of the tube and that of the large ovarian hematoma, the former being separated from it by a wall of compressed tissue measuring 1 to 2 mm. in thickness. The fimbriae on this side present a honey-combed formation of spaces, each a millimeter or less in size, and separated into irregular groups by septa of white fibrous tissue as in the left tube. Along the posterior inferior medial pole is a flattened yellowish body, 2 cm. x 0.5 cm., resembling an old corpus luteum.

Section IV, is 1 cm. thick. The large cavity is filled with clotted blood in which are scattered areas of lighter colored firmer tissue, probably old fibrin.

Microscopic Examination.—The wall of the ovarian hematoma is composed chiefly of dense collagenous tissue greatly thinned out except along the inner pole where there is considerable normal ovarian tissue. There are many old and recent adhesions

on the surface of the ovary. The structure of the wall varies. The thinner portions which are confined to the lateral half, are composed of dense fibrous tissue in which are a few smooth muscle fibers concentrically laid down, but not presenting any typical ovarian stroma. The greater part of the wall, however, is composed of characteristic ovarian stroma with numerous corpora albicantes, and primordial and graafian follicles in various stages of development. Recently ruptured graafian follicles are not found. The blood vessels in the wall are dilated and there are numerous areas of old and recent hemorrhage of varying sizes scattered through the wall. Considerable lymphocytic infiltration, chiefly perivascular, is present in the thinner areas of the wall. Numerous cystic cavities varying in size from less than a millimeter to 2 cm. in diameter, lined by low cuboidal epithelium and containing a small amount of epithelial debris, are present in all except the thinnest portions. The yellow body along the mesial pole appears to be an old corpus luteum or corpus albicans with places suggesting groups of luteum cells or large



Fig. 4.—Photomicrograph (X5) of a portion of the ovarian hematoma showing the gestation sac (a) in the center of which are the remains of the embryo (c). The embryo (c) is represented by an irregular amorphous mass lying in a gelatinous substance (c) which is contained within the chorionic and amniotic membranes (a). A group of chorionic villi is shown attached to the chorionic vesicle and extending out into the surrounding blood clot. Some of the villi of this same group are attached to the stroma lining the wall of the ovarian hematoma.

mononuclear phagocytes filled with blood pigment. Considerable hemorrhage, more recent than would be expected from the apparent age of the corpus luteum, is present in the center of this body which, however, has no definite connection with the large hematoma. The inner lining of the wall of the large hematoma presents the most interesting features. The greater part of it has no definite lining, the innermost layers which are compact, composed chiefly of organizing connective tissue, and contain a large amount of blood pigment, are fused with the large blood clot. This new connective tissue contains, particularly in the border zone, numerous large mononuclear cells filled with blood pigment. In other areas the hemorrhage seems to have extended into the wall from the central hemorrhage. Sections from other regions show a more definite demarcation and the hematoma is lined with low

emboidal epithelium. This epithelial lining is heaped up in some places so that it appears to be several cells deep. It is reflected over small buds of closely packed small round cells, probably lymphocytes, which are projecting into the hematoma. Several sections from various widely separated areas show in addition to these buds very definite papillary prolongations (Fig. 6) extending into the large hematoma, covered by columnar epithelium possibly ciliated, and having the stroma character-



Fig. 5.—Photomicrograph (low power) of some fairly well preserved chorionic villi which are scattered through the ovarian hematoma, the best preserved being along the periphery. Langhans' layer can be clearly seen on many of the villi.

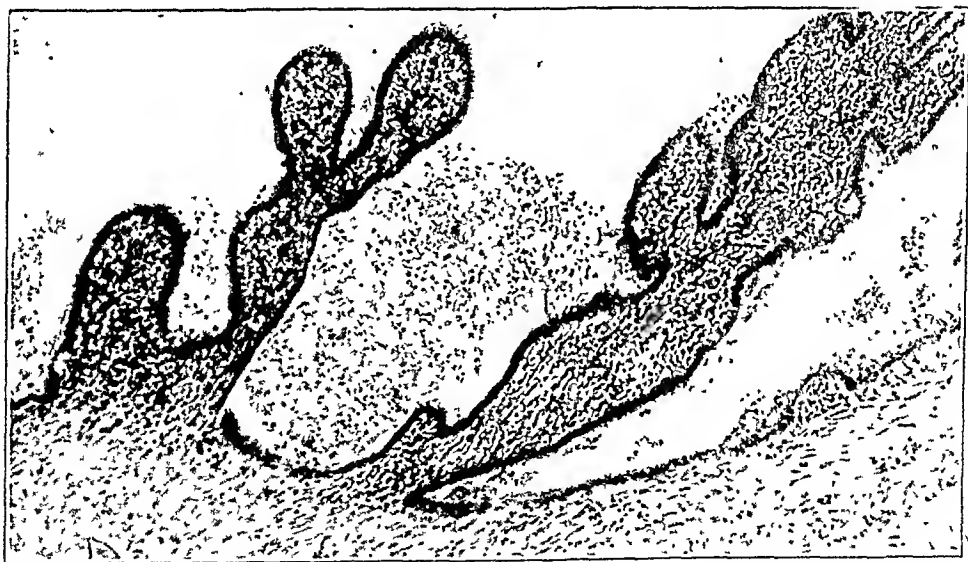


Fig. 6.—Photomicrograph (low power) of the müllerian tissue found lining the large ovarian hematoma in several widely scattered places. It resembles the papillary prolongations of the tubal mucosa and is covered with columnar epithelium.

istic of müllerian tissue. They resemble very strongly the papillary projections of the tubal mucosa.

The hematoma occupies the greater part of the sections, and is composed of blood in all stages of degeneration. Some areas contain a large amount of fibrin which is being organized. Other areas are disintegrating and becoming infiltrated by leucocytes of all types, polymorphonuclears often predominating. The chorionic

vesicle lies approximately in the center of this blood clot, and the whole area between the chorion and the ovarian stroma is studded with chorionic villi which are in all stages of degeneration with much leucocytic infiltration, but still possessing the characteristic structure of tropho-plasmoblastic layers and having the typical myxoid connective tissue center (Fig. 5). Many of the villi are attached to the chorionic vesicle and some are embedded in the proliferating connective tissue lining the hematoma. The greater number lie free in the blood clot and are in advanced stages of degeneration, but those along the periphery in contact with the wall stain normally, and hence undoubtedly derive their vascular supply from the wall.

The gestation sac (Fig. 4) is well outlined by the amniotic and chorionic membranes (a), which in some places are separated a short distance by blood clot, and in other places seem to be closely adherent to each other, or else one is absent. The structure of the membranes can quite distinctly be made out as an inner cellular layer of fair sized, rather oval-shaped, cells and an outer more homogeneous layer with a few nuclei. Just inside the membranes is a definite irregular zone (b) thickly studded with cells, the outlines of which are indistinct but the nuclei are quite large, ovoid, and stain fairly well with hematoxylin, the cytoplasm being filled with basophilic bodies. Numerous polymorphonuclears are also present in this area. Inside this zone is a homogeneous area (c), composed of old blood clot blending on its inner margin with another (d) of the same type just described. This surrounds the amorphous mass in the center (e), which is composed of degenerating cells of various sizes, shapes, and staining reactions, and while it undoubtedly represents the remains of the embryo, normal embryonic tissue was not found.

The tube, accompanying the hematoma shows an old chronic inflammatory process near the uterus. The infoldings of the mucous membrane are few and there is some lymphocytic infiltration. The distal portion of the tube is adherent to the surface of the ovarian hematoma. Where the fimbriated extremity is spread out over the hematoma the honeycombed spaces previously described are lined with ciliated epithelium and filled with desquamated cells, old blood, and debris. The walls are infiltrated with lymphocytes and the whole picture is that of a pseudofollicular salpingitis. The fimbriated extremity has no microscopic connection with the large hematoma and there is no evidence of any decidual reaction in the tube. Nor were any chorionic villi found.

The left tube shows a more marked pseudofollicular salpingitis than the right tube. The mucous membrane is much more hyperplastic, but there is less blood in the lumen. There is no decidual reaction in the left tube.

The left ovary is covered with old adhesions and contains a number of follicular cysts lined with low cuboidal epithelium. Corpora lutea are not present.

The uterus is microscopically negative except for a slight hyperplasia of the endometrium. A decidual reaction is not present.

DISCUSSION

The foregoing case adds nothing to the clinical picture of ovarian pregnancy, and in fact there are no symptoms or signs by which it can be accurately diagnosed as such. They are the same as for any other type of ectopic gestation.

The early death of the embryo can be attributed to a great many causes, such as development in an abnormal environment, poor blood supply, or some reaction of the surrounding tissues which is antagonistic

to its growth. Granting that a pregnancy may occur in a graafian follicle, it has been suggested by Meyer and Wynne¹⁹ that the epithelial cells internal to the luteal cells are inimical to the life of the embryo. The most probable cause of its death is the massive hemorrhage. In practically every case reported the chorionic villi have been found lying free in blood clot. The hemorrhage may be due to rupture of the growing gestation sac, the implanted ovum may be on or near the surface, or the synechial elements may perforate the ovarian capsule and allow the escape of intervillous blood. This hemorrhage breaks up whatever attachment the chorionic vesicle may have, and results in the rapid death of the embryo which then disintegrates, although the membranes may persist for a comparatively long time.

An important question is that concerning the type of tissue in which a fertilized human ovum may develop. Webster³ states that on phylogenetic grounds there is strong reason to believe that the fertilized ovum in the human female can begin its development only in tissue derived from the müllerian tract, and if it can be established that müllerian tissue can occasionally be found in the ovary, it is reasonable to suppose that the embedding of the ovum may take place in this tissue. This ectopia of müllerian tissues Webster himself saw, and its genesis has been rationally explained by Sampson.²³ The latter investigator has shown that during the menses, especially where there is any obstruction to the outflow, the menstruum containing bits of endometrium or tubal mucosa may pass out through the tubes into the peritoneal cavity, and that endometrial implants are often found in the pelvis on the structures which would readily be soiled by this blood. Blood has been observed exuding from the fimbriated extremity of the fallopian tubes in women operated upon during the menstrual period. Acting upon a suggestion of Dr. Sampson's I have examined such blood obtained at operation and have found in smears made from this blood, cells of epithelial morphology singly and in clumps. These cells would be most apt to become implanted upon the under and lateral surfaces of the ovary where they would most naturally fall in coming out of the tube (Sampson).²³ It is a very significant fact that nearly all of the cases of ovarian pregnancy have occurred in these same locations, rather than at the hilum, as suggested by Freund and Thome,²⁴ who base their opinion on the fact that the large blood vessels are located in that area. These endometrial implants react to menstruation and even to pregnancy, the same as any other müllerian tissue. Bleeding into these implants in the ovary at the time of the menstrual period gives rise to the formation of ovarian hematomas. Anderson²⁵ and others have stated that there has been no explanation of ovarian hematomas, and that they may all be ovarian pregnancies, but in view of the recent work of Sampson,²³ it is probable that many ovarian hematomas arise from endometrial implants and are of very common occurrence.

Webster³ in describing the areas in question advanced the view that they represent detached portions of müllerian tissue which have become adherent to the surface of the ovary, and further that it is possible that the genetic action of this müllerian tissue may sometimes determine the embedding and growth of a fertilized human ovum in the ovary. It is, then, definitely known that müllerian tissue commonly occurs in the ovary, and moreover, is often implanted there from the uterus or tubes and reacts much the same as any normally placed müllerian tissue. Therefore, knowing that ova are sometimes fertilized in the peritoneal cavity, it seems in accord with the performance of one of the most highly specialized functions of the human body, that the fertilized ovum should become embedded in müllerian tissue wherever it might be, as this tissue would present a more favorable reaction than would the peritoneum covering the pelvic structures or a blood clot in a graafian follicle.

I believe that the pregnancy in the case here presented may have occurred in an implantation of endometrial type located on the surface of the ovary, or in the cavity of an endometrial cyst, thus accounting for the presence of the müllerian tissue in the wall of the ovarian hematoma, in the center of which the remains of an embryo with its membranes was located. In reviewing the literature there are other cases which may have been of the same type; for instance Webster³ showed papillary prolongations projecting into the hematoma as villi covered with a syncytium, and which may have been müllerian in origin. McCann²⁶ also described a case which may have occurred in an endometrial implant as it was located in a multiloculated cystic ovary, and we know that in the rabbit, endometrial implants on the ovary are prone to form multilocular cysts as has been experimentally proved by Jacobson.²⁷ Dr. Jacobson has implanted bits of endometrium from a rabbit's uterus on and into the pelvic structures of the same rabbit, and these implants have there developed into endometrial cysts very similar in structure to those found in human beings. McCann also showed a definite adenomatous growth in the tissue just outside the gestation sac. Definite groups of cells which were undoubtedly epithelial, were seen on the surface of the ovary by Rubin²⁸ in the case which he presented, and these may have been müllerian in origin. Since there have not been any cases reported which have been examined in order to determine whether or not müllerian tissue was present, it is impossible to state how often this tissue occurs associated with pregnancy in an ovary.

Pregnancy in an endometrial implant may account for the decidual reaction claimed by many to be present, as this tissue certainly possesses as an inherent characteristic the potentiality of decidual changes. Decidual reactions have been seen in uterine pregnancy on the surface of the ovaries, broad ligament, posterior surface of the uterus, and in the culdesac by Webster,³ Norris,¹⁶ Rubin²⁸ and others. In other words, the distribution is identically the same as the endometrial implants described

by Sampson.²³ This is a very significant fact, and gives rise to the question whether the decidua escaped through the tubes and was implanted as such, or whether it is a response to the stimulus of pregnancy on the part of müllerian implants already there. Some observers think that this decidual reaction is due to some special quality inherent in the tissues, while others do not account for it at all. At any rate it is agreed that it is a characteristic solely maternal, and the implantation theory seems to be the most logical explanation yet offered.

Our case is one of pregnancy in an ovary although it is difficult to prove that it was primarily there. In nearly all cases in which the hematoma reached the size attained in this one the tube is necessarily in close contact with the hematoma and the fimbriae are often sealed over the outer surface of it. The further advanced the pregnancy the greater is the difficulty of determining what exact relation the tube may have borne to the ovary earlier in the pregnancy. The possibility of a tuboovarian pregnancy must be carefully considered in all cases of apparent ovarian pregnancies. Tubal pregnancies usually terminate early either by abortion or rupture, and by the former method if situated near the fimbriated extremity. The ovum escaping by tubal abortion or rupture presumably may become implanted on the pelvic or abdominal structures giving rise to a so-called abdominal pregnancy. There is also the possibility that the ovum may become embedded in a ruptured graafian follicle, on an endometrial implant, or in an endometrial cyst and give the appearance of having been primarily in the ovary. Pregnancy in an accessory tube which was closely apposed to the ovary would also present a confusing picture. It is difficult to prove that a pregnancy is primarily ovarian unless it is very early, and is found intact in an ovary which has no connection with the tube, and the villi being actually attached to some ovarian structure. There are other cases like ours in which the embryo is further developed and which might be considered ovarian in the absence of any other explanation. In our case the distal portion of the tube was attached to the ovarian mass, and there was some old blood and cellular debris in the dilated spaces of the tubal mucosa, but the same material was also present in the tube on the opposite side though to a lesser degree. The greater part of the fimbriated extremity may have been already attached to the ovary as a result of the preexisting pelvic inflammatory disease. Blood alone in a fallopian tube cannot be regarded as evidence of a pregnancy in that tube.

It is certain that chorionic villi cannot live long when floating free in blood, as is demonstrated by the marked degeneration of the villi present in sections of recent tubal pregnancies. A strong point in favor of the gestation in our case being primarily ovarian, or actually developing for a time in the ovary, is that a great many of the villi are well preserved and some are actually attached to the organizing tissue lining the large ovarian hematoma. One would not expect villi to live two or three

months, the approximate postmortem time of this embryo, unless they had definite connections with the wall of the hematoma in which they were found. Furthermore, this case complies with all of the criteria laid down by Spiegelberg with the modifications already stated. Hence it may be an example of primary ovarian pregnancy, the most extraordinary feature being that the ovum undoubtedly developed in müllerian tissue which represented either a congenital "rest" or, what is more likely was a müllerian implant acquired during adult life. This latter concept will have to be granted the most thoughtful consideration by students of ectopic pregnancy as being entirely rational and probably the correct explanation of many ovarian gestations. Another plausible mechanism consists in there having been primarily a tubal pregnancy which was followed by abortion into a cystic cavity in the ovary, which was lined *a primis* or *per secundum* by tissue of müllerian type. By that is meant that the cavity could be either that of a hemorrhagic (menstruating) cyst in the sense of Sampson, or else be derived from a graafian follicle which became lined with tissue from the mucosa of the tube, fragments of which tissue had been carried in with the ovum when it was extruded from the tube. In other words, "pregnancy in an ovary" is not necessarily a "primary ovarian pregnancy." It may be a secondary ovarian pregnancy. The distinction should be recognized.

CONCLUSIONS

1. The case presented is one of ovarian pregnancy of about six weeks' duration. It followed the typical course of an ectopic pregnancy and was operated upon approximately two to three months after the onset of the apparent termination of the pregnancy.

2. The important anatomic findings are the following:

- A. The tube on the side of the pregnancy was intact and free from any evidence of pregnancy.
- B. The hematoma enclosing the pregnancy occupied the position of the ovary.
- C. This hematoma was attached to the uterus by the uteroovarian ligament.
- D. Normal ovarian tissue was found in several places in the wall of the hematoma.
- E. Chorionic villi were found forming a junction between the chorionic vesicle and the connective tissue lining the ovarian hematoma.
- F. A degenerated embryo was located within this gestation sac.
- G. Müllerian tissue was found in several places in the lining of the wall of the ovarian hematoma.

3. The presence of the müllerian tissue in the ovary may be explained either by the implantation theory suggested by Sampson, or by the hypothesis that it is derived from a congenital "rest." The findings

strongly suggest the implantation of a fertilized human ovum in an endometrial implant upon the ovary, but another mechanism seems quite as plausible, i. e., a primary tubal pregnancy followed by extrusion of the fertilized ovum from the fimbriated extremity of the tube into a preformed cavity in the ovary, this cavity being either a menstruating cyst such as has been described by Sampson, or a graafian follicle or corpus luteum cyst which became lined with tubal mucosa, fragments of which were carried in with the ovum.

4. The study of this case would seem to make imperative a division of all cases of ovarian pregnancy into (1) primary and (2) secondary. A primary ovarian pregnancy is one in which the ovum after its fertilization undergoes the rest of its development within the ovary. A secondary ovarian pregnancy is one in which the ovum following its fertilization undergoes a certain stage of its development, usually very short, in some nearby structure or cavity, usually the fallopian tube, and then becomes implanted in the ovary.

BIBLIOGRAPHY

- (1) *Leopold*: Arch. f. Gynaek., 1882, xix, 210. Quoted by Norris (16). (2) *Ray, H. M.*: Ovarian and Abdominal Pregnancy—Their Morphological Possibility, Surg. Gyn. and Obst., 1921, xxxii, 437-442. (3) *Webster, J. C.*: Primary Ovarian Pregnancy, Trans. Am. Gyn. Soc., 1904, xxix, 65. (4) *Thompson, J. F.*: Ovarian Pregnancy with a Report of a Case, Trans. Am. Gyn. Soc., 1902, i, 1-15. (5) *Franz*: Über Einbettung u. Wachstum des Eis im Eierstock, Beitr. z. Geburtsh. u. Gynaek., 1902, vi, 70-81. (6) *Hewetson, J. T. and Lloyd, J.*: Ovarian Pregnancy with Notes of a Case, Brit. Med. Jour., London, 1906, ii, 568-573. (7) *Bryce, T. H., Tcaccher, J. H., and Kerr J. M.*: Contributions to the Study of the Early Development and Embedding of the Human Ovum, J. Maclehose and Sons, Glasgow, 1908. (8) *Hunter, J. I.*: A Case of Early Human Ovarian Pregnancy, Med. Jour. of Australia, 1921, ii, 233-240. (9) *Chienc, G.*: A Case of Early Ruptured Ovarian Pregnancy, Edinburgh. Med. Jour., 1913, x, 316-321. (10) *Holland, E.*: A Case of Ovarian Pregnancy, Proc. Roy. Soc. Med., London, 1911-12, v, 137-145. (11) *Stratz*: Quoted by Webster (3). (12) *Spiegelberg*: Arch. f. Gynaek., 1898, viii, 73. Quoted by Hunter (8). (13) *Williams, W.*: Text Book of Obstetrics. (14) *Jacobson, S. D.*: True Primary Ovarian Pregnancy; Operation; Recovery; Report of a Case with Microscopic Findings, Contrib. Sc. Med. and Surg.—N. Y. Post. Grad. Med. Sch. and Hosp. 1908, 241-294. (15) *Heincken*: Quoted by Caturani M., Ovarian Pregnancy with Report of a Case, Am. Jour. Obst., 1914, lxix, 409-428. (16) *Norris, C. C.*: Primary Ovarian Pregnancy and the Report of a Case Combined with Intra-uterine Pregnancy, Surg. Gyn. and Obst., 1909, ix, 123-131. (17) *Whitehouse, B.*: Remarks on a Case of Probable Ovarian Pregnancy, Brit. Med. Jour., 1910, i, 1276-1280. (18) *Lockyer, C.*: Two Cases of Primary Ovarian Pregnancy, Proc. Roy. Soc. Med., London, 1916-17, x, 158-182. (19) *Meyer, A. W. and Wynne, H. H.*: Some Aspects of Ovarian Pregnancy with the Report of a Case, Johns Hopkins Hosp. Bul., 1919, xxx, 338. (20) *Lieb, E.*: Echte Eierstocksschwangerschaft. Monatsschrift F. Geb. u. Gynaek., Berlin, 1921, liv, 102-108. (21) *Fallon, M. F.*: A Case of Ovarian Pregnancy, Boston Med. and Surg. Jour., 1921, clxxxiv, 144-150. (22) *Chalfant, S. A.*: Ovarian Pregnancy with Report of a Case, Penna. Med. Jour., Athens, 1920-21, xxiv, 549-551. (23) *Sampson, J. A.*: The Life History of Ovarian Haematomas (Hemorrhagic Cysts) of Endometrial (Müllerian) Type, AM. JOUR. OBST. AND GYN., 1922, iv, 451-512. (24) *Freund, H. W. and Thome, R.*: Eierstocksschwangerschaft, Virchows Arch. f. Path. Anat., Berl., 1906, clxxxiii, 54-91. (25) *Anderson, S.*: Primary Ovarian Gestation, Internat. Clin., Phila., 1917, Series 27, ii, 233-241. (26) *McCann, F. J.*: A Primary Ovarian Pregnancy at the Fourth Month, Proc. Roy. Soc. Med., London, 1912-13 vi, 229-231. (27) *Jacobson, V. C.*: The Autotransplantation of Endometrial Tissue in the Rabbit, Arch. Surg., 1922, v, 281-300. (28) *Rubin, I. C.*: A Case of Ovarian Pregnancy, Proc. N. Y. Path. Soc., 1911-12, Series II, 93-95.

THE REPAIR OF BIRTH LACERATIONS OF THE CERVIX UTERI

I. IMMEDIATE TRACHELORRHAPHY

By LUDWIG A. EMGE, M.D., SAN FRANCISCO, CALIFORNIA

(From the Division of Obstetrics and Gynecology, Stanford University, School of Medicine, San Francisco.)

ABOUT five years ago we undertook to investigate cervical lesions in regard to their sequelae among our patients at the Women's Clinic of the Stanford School of Medicine. We began this study by centering our attention on the sequelae of birth traumas and their relation to other disturbances of the generative organs. The survey of our material brought out among other facts that cervical lacerations of various degrees were present in about 80 per cent of all women who had borne children. Our material included all patients, regardless of the type of labor they had experienced or the individual attention they had received in their confinement. It is only fair to state here, that those who had been confined in our own maternity wards were left with cervical lacerations just about as frequently as those who had been attended elsewhere. In other words, surroundings and the best of obstetrical skill did not prevent cervical trauma.

We felt then, as we do today, that cervical birth lacerations have not been regarded with the necessary seriousness. It has been conservatively estimated that some 40 per cent of cervical lacerations ultimately lead to further pathology (Hirst). The remaining 60 per cent are made up by those small lacerations that have healed spontaneously by granulation, often not leaving any scars evident to visual examination but detectable to the trained finger as irregular deep-seated lesions. Although we do not know the relation of any of these cervical lesions to malignancy, generally speaking, no further disturbance arises from these small scars, as far as we know today. This aspect changes with the more severe lacerations, the majority of which may be productive of further pathology. Erosions with low grade infections, cystic degenerations and various degrees of cervicitis are the commonest resulting pathologic lesions. They in turn are conducive to parametritis, often leading to spasticity of the sacro-uterine ligaments with its sacral backache and feeling of weight in the pelvis; to congestive disturbances of the fundus of the uterus; and ultimately to hyperplasia and hypertrophy of the endometrium accompanied by menstrual disorders.

Commonly, the process ends in hypertrophy and fibrosis of the fundus of the uterus, often faultily called metritis. The relation of

cervical infections to bladder disturbances, and especially to trigonitis of obscure origin, is little appreciated and deserves special mention. It is further pointed out that all these lesions either simply, or as a whole, have a bearing on sterility. There also exists a relation between cervical pathology and reflex disturbances elsewhere. The writer has observed the relation of cervical lesions to nervous reflex symptoms manifesting themselves by obscure intestinal disturbances. It is not at all theoretical that they are directly related to disturbances of the sympathetic nerve supply. It is of interest to note in this connection that a careful study of cervical tissue removed at tracheloplasties will occasionally disclose sympathetic nerve fibers and ganglia surrounded by scar tissue. Since the correction of the cervical condition has been followed by an amelioration of the sympathetic disturbances elsewhere, especially in the intestinal tract, it is only reasonable to assume that an irritation of the cervical sympathetic innervation can set up reflex disturbances in any viscera whose sympathetic innervation is related to that of the cervix. In this connection the writer makes mention of his experience with two patients afflicted with epilepsy since childbirth. Both had extreme cervical lacerations with superimposed cervicitis. No further epileptic seizures occurred after extensive trachelorrhaphy with excision of the old scars. The bearing of cervical trauma to malignancy is too big a question to be discussed here. At the present knowledge of the etiology of cervical cancer we cannot deny that cervical trauma can be a factor, and may, perhaps, be the most important factor in the production of hypertrophy ending in cancer.

Considering the great number of disturbances that may arise from cervical lacerations we should aim to prevent the healing by granulation of these tears and promote primary union of the torn surfaces by some method of repair, either as immediate trachelorrhaphy at the end of labor, or as intermediate trachelorrhaphy during the early puerperium.

With this aim before us we undertook to inspect every cervix at the end of the third stage of labor and immediately repair all evident cervical lacerations which extended into the connective tissue. This method of treatment was begun by us late in 1918, and was mainly carried out by the Junior Staff of the Division of Obstetrics and Gynecology of Stanford School of Medicine at Lane Hospital, under the supervision of the Senior Attending Staff.

In order to facilitate matters we established the following routine for our method of repair. Under the observation of strictest asepsis two Young's vaginal retractors were introduced into the vagina after the expulsion of the placenta, and after 1 c.c. of "aseptic ergot" had been given intramuscularly. By pressure over the fundus by an as-

sistant, the cervix was then easily brought into view and with the aid of two sponge holders the organ was fully and quite easily exposed. An ether sponge was next applied to the raw edges. (The use of ether blanches the tissue, and the torn connective tissue can more easily be distinguished by its pale appearance.) Tears less than 0.5 cm. in length were disregarded allowing for later contraction. All other tears, which usually occurred in the angles of the cervix, were approximated by single mattress sutures. (See Fig. 1.) This type of suturing did away with cutting into the epithelial edges of the lips by the sutures, in case severe edema should occur. So-called "40 day" chromic catgut No. 3 threaded on large Mayo needles was used as suture material. Great care was taken to tie the

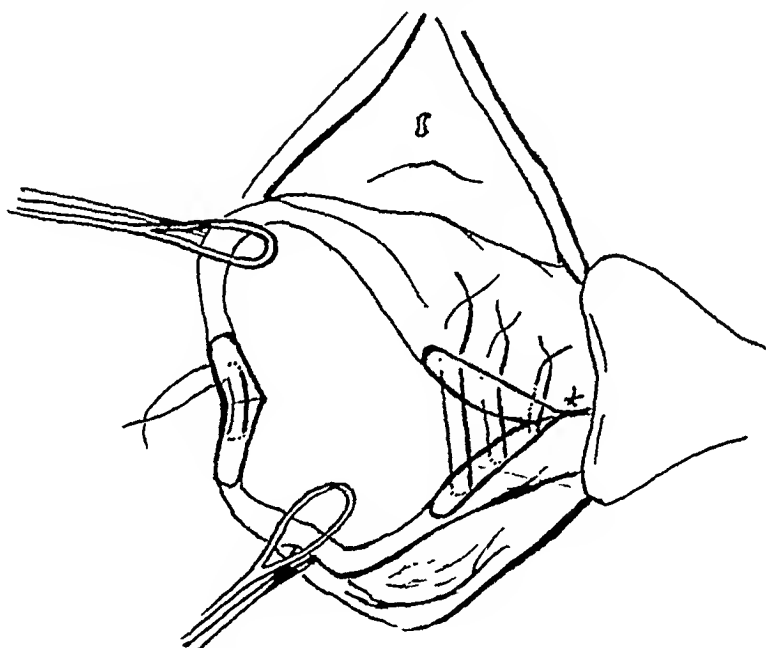


Fig. 1.—Semidiagram of a cervix at the end of the third stage of labor. Note the type of mattress suturing. Note that after tying the suture only the knot is visible and lies always on the anterior lip of the cervix. If edema should take place the knot will disappear under the epithelium. At no time will there be any cutting into the external repaired edges of the laceration, thus preventing transverse suture scars. Sutures can be laid wide apart and must be tied just firm enough to secure approximation, otherwise the buried portion of the suture will produce subcutaneous cutting.

sutures just tightly enough to evenly approximate the edges of the laceration, allowing for the slight amount of swelling that takes place soon after delivery. Primary union usually occurs within 24 to 48 hours after which the usefulness of the suture is problematic. Great care was taken at all times to avoid the narrowing of the normal outlet of the cervix in order to prevent any damming up of the lochial flow.

Sufficient time has elapsed since we undertook this work to report the end results of our cases for the first two years, covering 700 successive deliveries, in which number there is included a small group of

private patients. In reviewing the case histories of these 700 patients examined for cervical lesions at the end of labor, we found that it had been necessary to repair cervical tears in 73 patients, or slightly more than 10 per cent, which in the light of more recent work in our wards seems to be too low a percentage, and which must be blamed upon the difficulty of distinguishing these tears at the end of labor. We present our end results in Table I.

TABLE I
END RESULTS

	EXCELLENT	FAIR	FAILURE	TOTALS
Total	51 (70%)	15 (20.5%)	7 (9.5%)	73
Primipara	44 (83%)	8 (15.1%)	1 (1.9%)	53
Multipara	7 (35%)	7 (35%)	6 (30%)	20
Fever	8	5	1	14
Explained	6	3	0	9
Unexplained	2	2	1	5
Cervix				
Healed on dismissal	39	4	—	43
Healed on return	10	1	—	11
Slight lac. on return	—	6	1	7
Not healed	—	—	5	5
No return	2	4	1	7
Deliveries				
Normal	42	8	3	53
Abnormal	9	7	4	20
Average days in				
Bed	9	14	10	11
Hospital	13	17	12	14
Cervical aftertreatment	0	2	7	9

It is apparent that our results are best in primiparous women. The "excellent" results recorded are not confined to normal labors but include a number of forceps deliveries; just as the small percentage of "failures" includes several normal confinements. In primiparous women, failures become negligible. In multiparous women healing of immediate repairs is less successful because new tears follow the lines of old tears, exposing avascular areas of scar tissue which are not given to healing by simple approximation. They require excision of the scar, which we did not care to undertake at the period of repair, on account of the increased hazard of infection. We found it at all times difficult to distinguish between these recurrent tears and new tears. This greatly increases the difficulty in obtaining good results in multiparous women.

Our division of end results was based on the following criteria: "Excellent" we called any repair that was healed on dismissal from the hospital at the end of 10 or 12 days, or at the return of the pa-

tient four weeks after delivery. Under "fair" we classed those in which the repair had healed but where, on return of the patient, there were erosions or areas of granulation present which required a short after treatment to obtain a smoothly healed surface. As "failures" we counted those which had healed incompletely, or not at all.

With the exception of 7 patients of the 73 cases repaired at the time of labor, we had occasion to verify our results for each patient over a period of about one year. For the remaining seven we accepted the condition of the cervix on dismissal from the hospital as final.

In regard to morbidity, we found that 14, or 19 per cent, of the patients thus repaired developed fever above 100.2° F. It is only fair to state here that we included in this morbidity percentage, five patients in whom the rise above 100.2° F. occurred only once, and whose temperature thereafter remained relatively normal.

In analyzing the fever of these patients we were able to explain it in nine instances. In five we failed to find a satisfactory explanation, although in two the course and the curve of the fever suggested a deep seated phlebitis. Nevertheless, not having found a satisfactory explanation we must ascribe this morbidity to immediate trachelorrhaphy.

The fever of the remaining nine patients explained itself as follows:

Gonorrhea	1
Nonhemolytic streptococcus infection of the lochia (following abnormal deliveries) ..	3
Pyelitis and cystitis	1
Infection of the perineum	1
Postpartum hemorrhage (retained clot)	1
Retained placenta (saprophytic infection) ..	1
Old cervicitis and Bartholinitis	1

Although, at first glance a morbidity of 19 per cent is exceedingly high, the total morbidity for the entire seven hundred confinements reviewed was not raised over the average morbidity observed in our wards during other years, varying between 11 and 14 per cent. Furthermore, it must be taken into consideration that nearly one-third of the deliveries in which cervical repairs were done were abnormal. This factor in itself tends to raise the morbidity of a small definite group of cases in any given number of confinements, while it will not affect the total morbidity percentage materially, when a number of years are compared.

In regard to hospitalization we learned that the average stay of all patients repaired was increased to fourteen days over the usual average of thirteen days. We cannot ascribe this entirely to imme-

mediate cervical repair, but must again attribute it to the high percentage of abnormal deliveries in this group of patients, viz.: 27.5 per cent. We, therefore, find the longest hospitalization in the "fair" group where nearly one-half of the individuals were delivered abnormally. Although the number of abnormal deliveries in the patients under discussion was high, it constitutes the major portion of all abnormal deliveries for the 700 patients confined, and therefore the total percentage of interference remained within the normal average.

In regard to the percentage of patients requiring cervical repair the writer feels that it is by far too low. This must be attributed to lack of experience on the part of the Junior physician in recognizing lacerations.

In the light of more recent observations made in our wards, we feel that cervical repair should more nearly have approached the 40 per cent level. This subject will be taken up in a subsequent report on our experience with intermediate trachelorrhaphy.

In discussing the feasibility of immediate trachelorrhaphy it is only fair to quote the commonest objections which have been raised against this procedure. Outstanding above all is that of the increased danger of infection. We have shown that this has not been our experience, and we therefore can confirm the findings of Bubis, Reder, Davis and Skeel, who found that morbidity is not materially influenced if proper aseptic precautions are taken.

In regard to technic we agree to some extent with those who claim that the technic of immediate trachelorrhaphy is not devoid of difficulty, and that it requires a good deal of experience in recognizing cervical tears at the end of labor. In fact, this is the most difficult task in the entire procedure and can only be overcome by experience. On the other hand, we cannot agree with those whose objections are based upon difficulties arising from the cutting out of the sutures in the course of the average postpartum edema. We have succeeded in overcoming this difficulty by the method of suturing described. The objection raised by some that primary cervical repair prevents free drainage of the lochia is lacking in logic, because when such a repair is done properly by only restoring the outlines of a normal cervix, retention of lochia does not happen more frequently than is observed in any given number of confinements.

As a whole, we grant that the technic of cervical repair will always be cumbersome, if not difficult, unless carried out under proper surroundings with at least one, or still better, two assistants. In other words, obstetrical and surgical skill, assisted by a trained crew in a well conducted hospital, are absolute essentials for this work. It is a procedure not to be undertaken lightly, since more harm than good may be done unless every precaution of asepsis is observed.

That there is in this enlightened age still a group of those who contend that cervical lacerations will heal spontaneously without after effects, is surprising, if not deplorable. Just because a laceration is covered, in due time, with epithelium does not exclude it from giving rise to further disturbances. This contention is therefore no objection, but a lack of knowledge. To object to either immediate or intermediate cervical repair just because these lesions will heal in some fashion is short sighted, and defeats the aim of prophylactic medicine.

In this connection we must mention the "conscientious objector" who opposes cervical repair at labor on account of having to enter

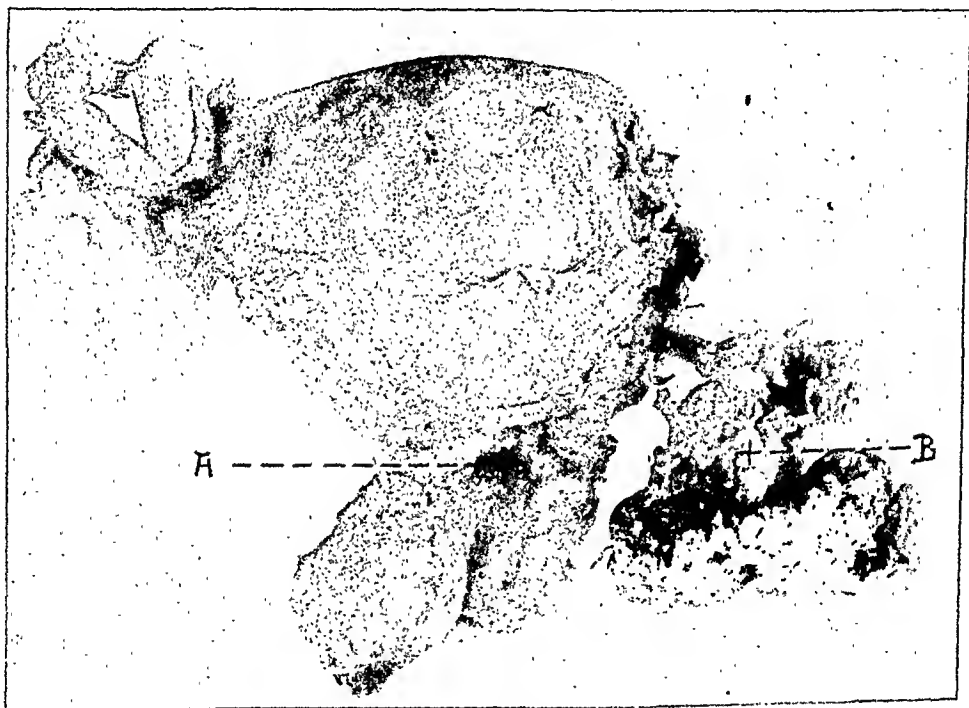


Fig. 2.—The uterus of a patient forty-one years old. (By courtesy of Dr. A. B. Spalding.)

A, Cervical tear which had extended above the internal os and continued through the left parametrium. The rent was spontaneously closed by a portion of the omentum (B), which at operation was found to extend well into the cervical canal. The patient had had a long, hard labor seventeen years previously without any undue bleeding. She came to operation on account of menorrhagia during the last four years. This is an excellent demonstration of a very severe cervical tear without bleeding.

the sacred precincts of the birth canal. This, in itself, is a fair objection. Nevertheless, we will find that the very same person offering this objection often will employ forceps at any provocation, and introduce a gauze roll into the birth canal every time he has to do a perineorrhaphy in order to keep his field blood free, without the slightest fear of consequences. I refrain from further comment.

That a cervix should not be repaired at once, unless serious bleeding had resulted from lacerations, is the objection of another group.

This attitude is based on faulty observation, and our textbooks are greatly to blame for this. It has been our good fortune to see a number of cervical tears, a few in our own wards immediately after instrumental deliveries and some others years after delivery elsewhere, where laceration extended deeply into the broad ligament, and in one instance through the broad ligament without producing hemorrhage of any consequence (Fig. 2). The reason for this is, that the peculiar fan-shaped arrangement of the connective tissue bundles of the cervix allows an unusual degree of retraction and contraction of these bundles. This physiologic function of the cervical tissue is, therefore, hemostatic in character and explains why bleeding is comparatively rare even in the presence of deep tears. I have no doubt that without this marvelous provision of Nature, many women would have died from hemorrhage in the course of unskilled operative deliveries, or in the course of unattended stormy confinements.

In conclusion, I claim that immediate cervical repair at the end of the third stage of labor is feasible and advisable, if it is performed by an experienced obstetrician under ideal conditions and proper surroundings. It requires the development of a special technique and experience in recognizing cervical lacerations at this period. It is not devoid of danger, but when carried out with proper regard to asepsis will not materially influence morbidity. It may, or may not, slightly prolong the hospital stay of the patient depending entirely upon the type of preceding delivery. It gives excellent results in primiparous women, of whom 83 per cent do not require any further local treatment. It is unsatisfactory in multiparous women, whose previously torn cervix prevents healing on account of insufficient blood supply.

NOTE: The original survey of part of the material discussed here was made by Paul Herman Streiehan, M.D., who incorporated his findings in a thesis for the degree of Doctor of Medicine at this Institution in 1919. His untimely death in Honolulu in 1920 has been greatly mourned by his friends and teachers. It is to the memory of Dr. Streiehan, whose ardent spirit for knowledge has not been forgotten, that this publication is dedicated.

BIBLIOGRAPHY

Bubis, J. L.: Cleveland Med. Jour., 1918, xvii, 149. *Davis, E. P.*: Operative Obstetrics, 1912, p. 402. *Hirst, B. C.*: Jour. of Obst., 1917, lxxv, 755. *Reder, F.*: Am. Assn. Obst. and Gynec., 1918, xxx, 45. *Skrel, A. J.*: Cleveland Med. Jour., 1918, xvii, 83.

STANFORD UNIVERSITY HOSPITAL.

THE ABDERHALDEN REACTION

AN ATTEMPT TO BRING IT WITHIN THE REALM OF PRACTICABILITY

BY FREDERICK C. SMITH, M.D., M.Sc. (MED.) AND VINCENT
T. SHIPLEY, M.D., M.Sc. (MED.), PHILADELPHIA, PA.

*(From the Pathological Laboratories of the Graduate School of Medicine of the
University of Pennsylvania.)*

REALIZING that a practical serologic test for the diagnosis of pregnancy would be a boon to medicine, the writers determined to attempt to so modify the technic of the Abderhalden reaction as to overcome its manifest errors and to bring it within the realm of practicability. With this idea as a goal 131 sera were tested, 43 of them being from pregnant women, 15 from nonpregnant women, and 73 from males.

Great care was taken to minutely follow all the details of technic which Abderhalden insists are essential in order to get correct results. The blood was collected aseptically by the writers themselves into sterile test tubes and, after separating, the serum was removed from the clot and centrifuged at about 1500 revolutions per minute for fifteen minutes and then pipetted into another sterile test tube. Serum colored with hemoglobin was not used. All glassware and other materials were carefully cleaned and sterilized both before and after each time they were used, and nothing that entered into the test was ever allowed to be touched by hands after sterilization. Sterile distilled water was used throughout the experiments. No one else used the laboratory where the work was being carried out, and no other work was done in this laboratory during the course of the tests.

The dialyzing shells used in the test were the 16 by 50 mm. 579A, manufactured by Schleicher and Schüll of Düren, Germany. Before being used in the test they were tested with a 5 per cent egg albumen solution for impenetrability, and with 1 per cent peptone solution for penetrability. Those that permitted the solution of egg albumen to pass through, and those that did not permit the solution of peptone to pass through into the surrounding dialysate of sterile, distilled water after an incubation period of eighteen hours, were discarded. Falsely positive tests were always checked by retesting the shells with the albumen solution. The shells were sterilized by boiling in distilled water for one minute, and when not in use were kept immersed in jars of sterile, distilled water and covered with a layer of toluol.

The ninhydrin solution was prepared by dissolving 0.1 gm. of the drug in 10 c.c. of water. It was kept in the ice chest when not in use.

The placental antigen was most carefully prepared. Three or four normal placentas were secured and thoroughly washed in running tap water until entirely free from blood. All connective tissue was then carefully picked out along with any discolored particles and the remaining tissue again washed until it was snow white in color. It was then boiled with a hundred times its bulk of distilled water containing five drops of glacial acetic acid for ten minutes. This water was discarded and the coagulated placenta gone over with a sterile forceps to pick out any possible remaining small blood clots or discolored particles of tissue. The boilings were continued six times but without the acid, the water being discarded after each boiling. On the final boiling the tissue was just covered with water and the boiling continued for fifteen minutes. Five c.c. of this water was then tested with 1 c.c. of ninhydrin solution by boiling for sixty seconds, and if the tested water remained entirely free from color for thirty minutes the antigen was ready for use. It was then kept in the ice chest covered with water and a layer of toluol.

The actual test was performed by placing 0.5 gm. of dried antigen into a dialyzing shell and adding 1.5 c.c. of the serum to be tested. The shell was then placed in a glass cylinder measuring 35 by 95 mm. and 20 c.c. of water placed in the cylinder so that the shell was now about one third immersed in the water. The contents of the shell and the dialysate were then covered by a layer of toluol and the cylinder plugged with sterile cotton. A serum control was set up at the same time in exactly the same manner, except that the placental antigen was omitted, and a placental control in the same manner, except that 1.5 c.c. of water was substituted for the serum. These cylinders were then placed in an incubator at body temperature for eighteen to twenty-four hours and 10 c.c. of the dialysate then tested by boiling for sixty seconds with 0.2 c.c. of the 1 per cent ninhydrin solution. In the first forty-two tests the results were read as negative if the water remained uncolored at the end of thirty minutes, plus-minus if there was a slight color, and plus if the color was greater than plus-minus. It soon became apparent, due to the large number of positive reactions, that a greater accuracy in reading the results would be obtained if a color scheme were set up and the results read in a manner similar to the Wassermann test. Accordingly a color scale was made, and the remaining tests were noted as four-plus, three-plus, two-plus, one-plus, plus-minus and negative. Sloan¹ claims that the depth of color is no gauge to the amount of digestion that has occurred due to the ninhydrin being so easily affected by physical and mechanical factors. However, it seemed to the writers that there was a fairly constant increase in the depth of the color in those tests that should be positive over those that were falsely positive, but not certain enough to be of clinical significance.

TABLE I
THE ABDEGHADEN TEST

SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST
1	M	-	+	36	M	-	-	80	M	-	+3	106	F	9	+4
2	F	-	±	37	F	-	-	81	M	-	+3	107	F	9	+3
3	F	-	±	43	M	-	-	82	M	-	+2	108	M	-	+3
4	M	-	±	44	M	-	-	83	M	-	+3	109	F	9	+3
9	F	6	+	45	M	-	-	84	M	-	+2	110	F	9	+3
10	F	8	+	46	F	-	-	85	M	-	+3	111	F	9	+3
11	F	8	+	47	F	-	-	86	M	-	+3	112	F	9	+3
12	F	8	+	48	M	-	-	87	M	-	+2	113	F	7	+2
13	M	-	+	49	M	-	-	88	M	-	-	114	F	8	+1
14	F	9	+	56	M	-	-	89	M	-	+3	115	M	-	+2
15	F	-	+	57	M	-	-	90	M	-	+3	116	M	-	+4
16	M	-	+	58	M	-	-	91	M	-	+2	117	F	8	+3
17	M	-	-	59	M	-	-	92	M	-	+1	118	F	7	+1
18	F	9	-	60	M	-	-	93	M	-	+2	119	F	-	+2
19	M	-	+	61	M	-	-	94	M	-	+2	120	F	-	-
21	M	-	+	65	M	-	-	95	F	9	+3	121	F	-	+2
22	M	-	+	66	M	-	-	96	F	9	+3	122	F	-	+2
23	F	-	+	67	M	-	-	97	F	9	+2	123	F	6	+2
24	F	-	+	72	M	-	-	98	F	9	+2	124	M	-	+3
25	F	8	+	73	M	-	-	99	F	9	+1	125	F	9	+3
29	F	9	+	74	M	-	-	100	M	-	+2	126	F	9	+4
31	F	9	+	75	M	-	-	101	M	-	+1	127	F	9	+1
32	F	9	+	76	M	-	-	102	M	-	+2	128	M	-	+1
33	F	9	+	77	M	-	-	103	M	-	+2	129	M	-	+3
34	F	9	+	78	M	-	-	104	M	-	+3	130	M	-	+1
35	F	9	+	79	M	-	-	105	M	-	+2	131	M	-	+3

Controls were negative. The figures in the columns headed "pregnant" indicate month of gestation.

Bronfenbrenner's² modification of the Abderhalden technic was carried out on 55 sera, 26 from males, 7 from nonpregnant women, and 22 from pregnant women. All were positive except two of the sera from males.

The technic consists of placing together in a sterile test tube 1.5 c.e. of the serum to be tested and 0.5 gm. of the placental antigen and refrigerating for eighteen to twenty-four hours at 6° C. Five c.e. of water is then added and the tube centrifuged for ten minutes. The water and serum are then pipetted off and the tube again centrifuged with 5 c.e. of water added. This water is again pipetted off, the placental antigen dried between sheets of sterile filter paper, and a test set up by the regular Abderhalden technic using the sensitized antigen and 1.5 c.e. of male guinea pig serum. The supposed specific enzyme of the pregnant serum is expected to unite with the supposed specific properties of the antigen, so that the latter can then be digested by the normal, nonspecific enzymes which are present in any serum.

TABLE II
THE BRONFENBRENNER TECHNIC

SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST
1	M	-	+	31	F	9	+	50	F	8	+
2	F	-	+	32	F	9	+	51	F	8	+
3	F	-	+	33	F	9	+	52	F	9	+
4	M	-	+	34	F	9	+	53	F	8	+
5	M	-	+	35	F	9	+	54	F	8	+
6	M	-	+	36	M	-	+	55	F	7	+
7	F	-	+	37	F	-	+	58	M	-	+
8	M	-	+	38	F	6	+	59	M	-	+
9	F	6	+	39	F	9	+	60	M	-	+
10	F	8	+	40	F	9	+	61	M	-	+
11	F	8	+	41	F	9	+	62	M	-	+
12	F	8	+	42	F	9	+	63	M	-	+
20	M	-	-	43	M	-	+	64	M	-	+
25	F	8	+	44	M	-	+	68	M	-	+
26	M	-	+	45	M	-	+	69	M	-	+
27	M	-	+	46	F	-	+	70	M	-	+
28	F	-	+	47	F	-	+	71	M	-	+
29	F	9	+	48	M	-	+				
30	M	-	+	49	M	-	+				

Controls were negative. Figures in the columns headed "pregnant" indicate month of gestation.

A third problem attempted was to so reduce the dose of the serum to be tested that falsely positive results would be eliminated while at the same time true positive results would be maintained and give a reliable reading. Twenty-one sera, eleven from pregnant women and ten from males, were tested by the regular Abderhalden technic but with decreasing doses of the serum. All of the positive readings

TABLE III

THE ABDERHALDEN TECHNIC WITH SMALLER DOSES OF SERUM

SERA FROM PREGNANT WOMEN					SERA FROM MALES			
SERUM	MONTH OF GESTATION	1.5 c.c. OF SERUM	1.0 c.c. OF SERUM	0.5 c.c. OF SERUM	SERUM	1.5 c.c. OF SERUM	1.0 c.c. OF SERUM	0.5 c.c. OF SERUM
96	9 mo.	+3	+2	+1	85	+3	+1	±
111	9 mo.	+3	+3	+1	86	+3	+2	-
112	9 mo.	+3	+1	±	87	+2	+1	±
113	7 mo.	+2	+1	+1	89	+3	+1	-
114	8 mo.	+4	+2	-	91	+2	+1	-
117	8 mo.	+3	+1	-	92	+1	±	±
118	7 mo.	+3	+1	-	93	+2	+1	-
123	6 mo.	+2	+1	-	94	+2	+1	-
125	9 mo.	+3	+2	-	102	+2	+1	-
126	9 mo.	+4	+2	±	103	+2	+1	-
127	9 mo.	+4	+2	-				

Controls were negative.

were reduced in an exactly similar manner so that it was evident that 1.5 c.c. of serum was the irreducible minimum dose for the test.

An attempt to destroy the normal ferments by heating the sera was made. Twenty-nine sera were used in this experiment, twenty-four of them being from males and five from pregnant women. Twenty sera were heated in a water-bath at 55° C. for thirty minutes, fifteen at 55° C. for thirty minutes and then at 60° C. for thirty minutes, six at 60° C. for thirty minutes, and six at 60° C. for sixty minutes. The destruction of ferments in the sera from the pregnant women was about equal to the destruction of the ferments in the males, so that the falsely positive results could not be eliminated in this manner. The regular Abderhalden technic was used.

The fifth problem was an attempt to get rid of nonspecific ferments by dialyzation. Three tests were set up on each serum by the regular Abderhalden technic (the layer of toluol being omitted) and were then placed in the refrigerator at 6° C. At the end of twenty-four hours one cylinder was removed and labeled No. 1. The dialysate was then tested in the usual manner with the ninhydrin solution and the shell removed to another cylinder. Twenty c.c. of sterile distilled water were added to the cylinder as in the regular test, the water and contents of the shell covered with a layer of toluol, the cylinder plugged with cotton and placed in the incubator at body temperature for eighteen to twenty-four hours, and the dialysate then tested. At the end of the second twenty-four hours the procedure was repeated on cylinder No. 2, and at the end of the third twenty-four hours on cylinder No. 3.

Six sera were tested, three of them being from males and three from pregnant females. The unsatisfactory results would indicate

TABLE IV
THE EFFECT OF HEAT ON THE ABDERHALDEN TEST

SERUM	SEX	REGULAR TEST	55° FOR 30 MIN.	55° FOR 30 MIN. THEN 60° FOR 20 MIN.	60° FOR 30 MIN. 60 MIN.	SERUM	SEX	PREGNANT	REGULAR TEST	55° FOR 30 MIN.	55° FOR 30 MIN. THEN 60° FOR 30 MIN.	60° FOR 30 MIN. 60 MIN.
49	M	+1	±			79	M	-	+2	-		
56	M	+2	+2			80	M	-	+3	+1		
57	M	+2		+2		81	M	-	+3	±		
58	M	+2	+1	-		82	M	-	+3	+2		
59	M	+2	±			83	M	-	+3	+2		
60	M	+3	-			84	M	-	+2	+1		
61	M	+2				85	M	-	+3			
65	M	+3	+1			86	M	-	+3			
66	M	+3	-			87	M	-	+2			
67	M	+3	+2	+1		95	F	9	+3	+1		
72	M	+2	+1	-		96	F	9	+3	+1		
73	M	+3	+1	±		97	F	9	+2			
74	M	+2	+1	+1		98	F	9	+2			
75	M	+3	+1	+1		99	F	9	+4			
78	M	+3	±	-								

Controls were negative.
The figures in the columns headed "pregnant" indicate month of gestation.

TABLE V

THE EFFECT OF DIALYZATION ON THE ABDERHALDEN TEST

SERUM	SEX	PREGNANT	REGULAR ABDERHALDEN TEST	DIALYSATE NO. 1	ABDERHALDEN NO. 1	DIALYSATE NO. 2	ABDERHALDEN NO. 2	DIALYSATE NO. 3	ABDERHALDEN NO. 3
115	M	—	+2	—	—	—	—	—	—
116	M	—	+4	+	—	—	—	—	—
123	F	6	+3	+	+3	—	+	—	+
124	M	—	+3	+2	+1	+	+	—	+
125	F	9	+3	—	+1	—	+1	+	+1
126	F	9	+4	—	+1	—	+1	+	+1

Controls were negative. The numbers in the column headed "pregnant" indicate the month of gestation.

TABLE VI

THE ABDERHALDEN TEST SHOWING THE EFFECT OF THE ABSORPTION OF FERMENTS

SERUM	SEX	PREGNANT	ABD. TEST PLAC. ANTIG.	ABD. TEST B. H. ANTIG.	INCUBATED WITH B. H. ABD. WITH PLAC.	INCUBATED WITH B. H. ABD. WITH B. H.	INCUBATED WITH PLAC. ABD. WITH PLAC.	INCUBATED WITH PLAC. ABD. WITH B. H.
100	M	—	+2	+2	—			
101	M	—	+1	+1	+			
102	M	—	+2	+1	+			
103	M	—	+2	+2	+			
104	M	—	+3	+3	+			
105	M	—	+2	+1				
106	F	9 mo.	+4	+2	+1			
107	F	9 mo.	+3		+2			
108	M	—	+3		+3			
109	F	9 mo.	+3	+2	+1	+		
110	F	9 mo.	+3	+3	+2	+1		
111	F	9 mo.	+2	+2				
112	F	9 mo.	+3	+1	+1		+	
113	F	7 mo.	+2	+1				
114	F	8 mo.	+4	+4	+2			
117	F	8 mo.	+3					+2
118	F	7 mo.	+3					+1
123	F	6 mo.	+2					—
125	F	9 mo.	+3				+2	
126	F	9 mo.	+4				+2	
127	F	9 mo.	+4				+2	
128	M	—	+4			+1	+1	
129	M	—	+3			+	+	
130	M	—	+4			+1	+1	
131	M	—	+3			+1	+1	

Controls include a beef heart control as well as the usual serum and placental controls. All were negative.

that the antigen is probably sensitized and takes up all the ferments from the serum.

The final experiments endeavored to remove the nonspecific ferments with a beef heart substratum and to establish the specificity of the placental antigen. The beef heart substratum was prepared

in exactly the same manner as the placental antigen, and kept in the ice chest covered with sterile distilled water and a layer of toluol. In this series, in addition to the regular Abderhalden test, a test was carried out on each of thirteen sera using the regular technic but substituting beef heart for the placenta. Eight of these showed a slight reduction in the positiveness of the result.

Twelve sera were tested by placing 2.0 c.c. in a sterile test tube with 0.5 gm. of beef heart and incubating at body temperature for two hours. The tube was then centrifuged, the serum pipetted off, and a regular Abderhalden test set up with the placental antigen. This gave a marked reduction in the positiveness of the test in all the sera.

Six sera were tested as above, except that the Abderhalden test was set up with the beef heart substratum. A marked reduction in positiveness again occurred in all the sera.

Nine sera were tested as above, incubating the sera with placenta and setting up the test with placenta. Three sera were tested by incubating with placenta and setting up the test with beef heart. The results here were very little different from the preceding.

Two c.c. were used rather than the standard 1.5 c.c. to make up for the small loss in centrifuging with the substratum and transferring to the shells.

CONCLUSIONS

While the natural ferments present in serum are somewhat increased there is no evidence that a specific ferment exists in pregnancy.

The tests on the serum of pregnant women were uniformly positive, but the large number of positive results on the sera of men and nonpregnant females proves the test of no value for the diagnosis of pregnancy.

REFERENCES

- (1) Am. Jour. Physiol., 1915, xxxix, 9.
- (2) Jour. Lab. and Clin. Med., 1916, i, 79.

THE NEWBORN SERVICE IN A UNIVERSITY HOSPITAL

BY LEONARD T. DAVIDSON, M.D., AND OTTO S. KREBS, M.D.,
ST. LOUIS, MO.

(From the Departments of Pediatrics and Obstetrics, Washington University School of Medicine, and the Newborn Service of the Barnes Hospital.)

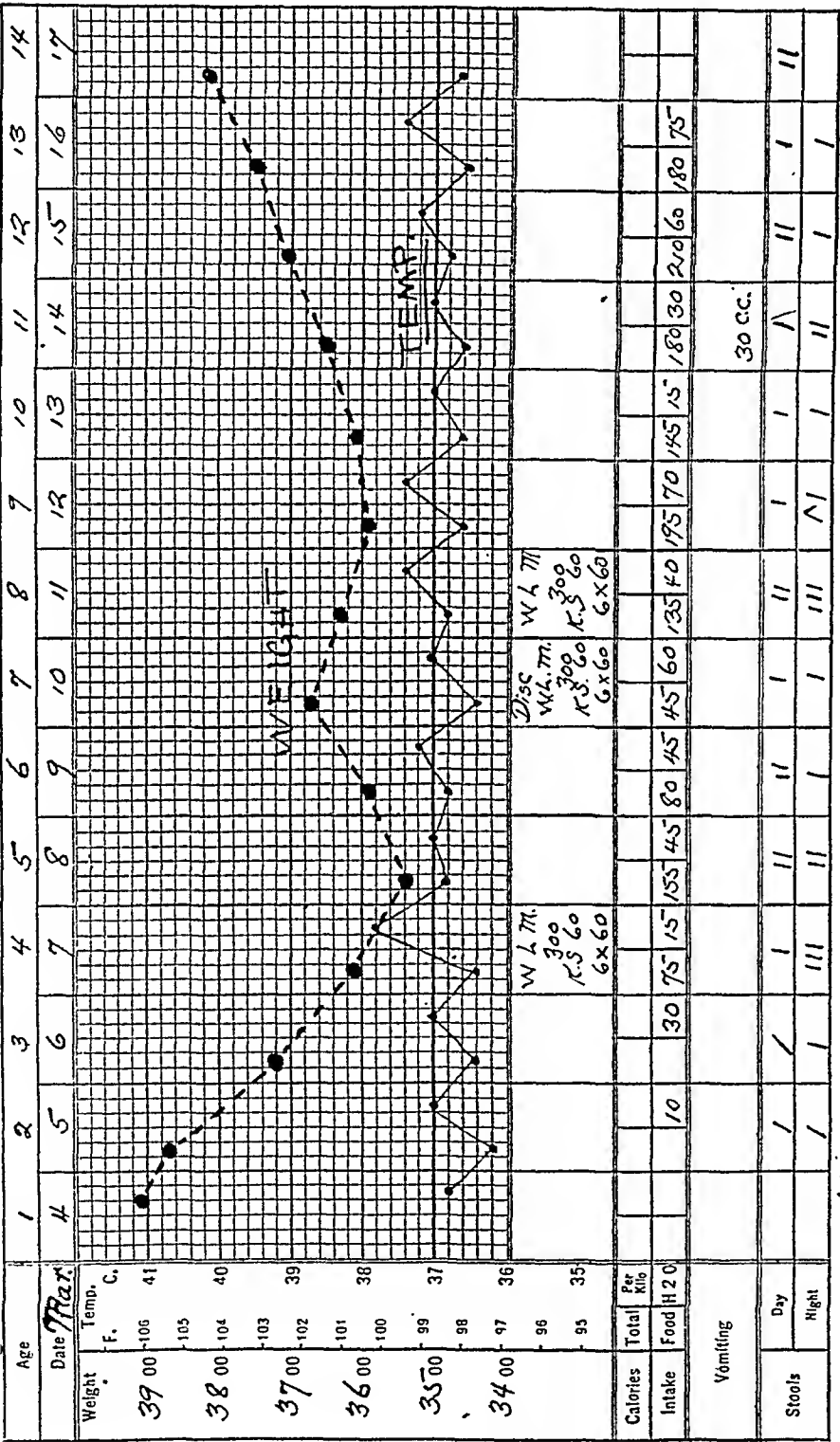
THE purpose of this paper is to describe a plan of co-operative supervision of the nursery of a maternity service and to point out what we believe to be some of the advantages of such management.

About two years ago a plan was worked out between the obstetrical service of Barnes Hospital and the Pediatric Department of the St. Louis Children's Hospital, both under Washington University, whereby the newborn infant through the period of its hospital stay of two weeks should be under the joint observation of both departments. This idea was not new for it had been in successful operation abroad (Vienna) and in at least two university hospitals in this country (Minnesota, California). There are a number of reasons why such dual control should be of advantage. The baby as a separate individual is deserving of the same specialized and efficient care which the mother has had before and after delivery. The baby is not and never has been the primary interest of the obstetrician, nor should he be. The obstetrician is essentially a surgeon and his time and interests are to so large an extent taken up by his own specialty that it is not to be expected that he could give much of either to the baby and its needs. It has been said by many opponents of this dual scheme that the infant through the early weeks is practically "fool proof" and will thrive no matter what happens. This is probably true of the more primitive peoples, but as our civilization becomes more and more complex with all the varied cross influences on the human being, so the deviations from the normal become multiplied, and nowhere is this more apparent than in childbirth and all its attendant circumstances. It has been quite evident that on the colored division of the obstetrical service the infant is more hardy, fewer complications in the newborn period arise, the breast supply is more abundant and fewer artificial feedings are necessary. We have made great strides along the line of prenatal care. Should this not be complemented in the early postnatal weeks by the very best of knowledge and judgment that is at our disposal?

This is not a plea for handing over the newborn infant wholly to the pediatrician. Its relation to the mother is still so close that only by constant consideration of her condition postpartum, both mental and physical, can the infant's best good be obtained. The ideal ar-

ST LOUIS CHILDREN'S HOSPITAL

NAME _____ NO _____



Discharged

Cord 078

Weight a.s. r.p.c. for 24 hrs.
Disc comp. feed.

Born at 9:45 P.M.
Eyes Crede'

Fig. 1.

Form 7A.

rangement would be one in which the obstetrician and pediatrician, or a representative from each service, had joint responsibility for and supervision of the nursery.

It was, therefore, with these factors in mind that the newborn service at the Washington University Clinic was organized along the following lines: The newborn infant is formally admitted to the hospital as a patient, is given a regular hospital number, and the records and charts are kept as for any other patient. The temperature and weight chart conforms in every detail with that used on the Infant Ward of the Children's Hospital. This has appropriate ruling and spacing for the daily record of weight, temperature, food intake in kind and caloric value, water intake, the amount of vomiting, the

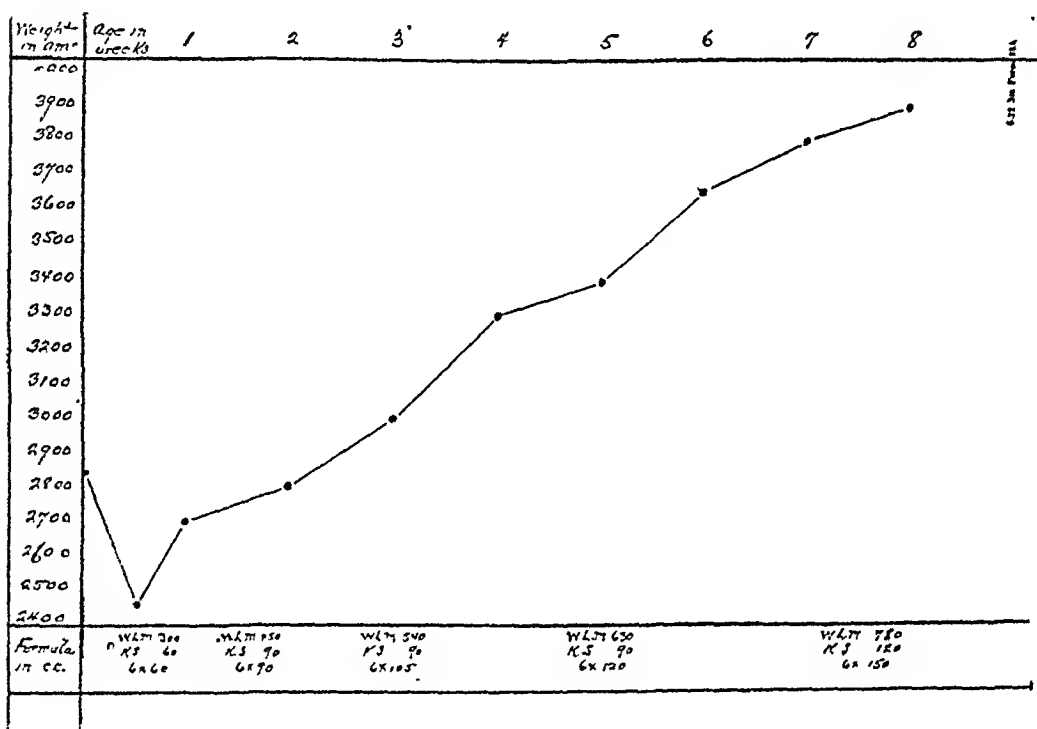


FIG. 2.

number and character of stools, and below a space for doctor's orders. (Figs. 1 and 2.)

The direct responsibility lies in the hands of the obstetrical interne. He does a complete physical examination which he records, together with a statement of the history of labor and facts of importance in the family history. Joint rounds are made daily in the nursery by the obstetrical and pediatric residents. The interne joins these rounds whenever possible, discussing the cases, both infants and mothers, with the residents. There is present also the nurse in charge of the nursery. By the time rounds are made she has weighed and bathed the infants, summarized the food and water intake, the stools, the vomiting and so forth. She is able to give valuable information as

to the baby's general activity, its action at the breasts, the condition of the breasts, the milk supply, any bleeding that may have occurred and other important points.

The physical examination is checked by the pediatrician and a note made in agreement or disagreement with that of the interne. The charts are studied, comparing food intake with weight lost or gained. If weight is lost, the causes for the loss are sought for in both mother and infant. Such factors as delayed secretion, sore or fissured nipples, depressed nipples, turgidity of the breasts, and of course, actual insufficiency of secretion are all considered. On the part of the infant the usual causes of poor nursing are sought for or ruled out. These causes include congenital anomalies, weakness, nasal obstruction, birth hemorrhage, idiocy, etc.

The nursing routine of the normal newborn infant is briefly as follows: it is put to the breast about twelve hours after delivery and thereafter every four hours. The breasts are alternated. Feeding hours are 5 A.M., 9 A.M., 1 P.M., 5 P.M., 9 P.M., and 1 A.M. Water is given midway between feedings through the day only.

Premature infants, very small or weak infants, and those suffering from intracranial injury, malformations of the heart, atelectasis, and so forth, are not put to the breast during the first few days of life, but are kept as quiet as possible until the mother's secretion is established, and thereafter until their condition warrants handling. The following routine has been found sufficient for premature infants with birth weights above 1500 grams. The infant is put into a room by itself, the temperature is kept at approximately 80 to 85° Fahrenheit. Electric heaters under the crib and hot water bottles about the baby are used to supplement the usual heating devices. Instead of swathing, the infant is dressed in the ordinary woolen shirt and stockings and soft diaper and wrapped in a woolen blanket outside which hot water bottles are placed. The infant is not bathed but is oiled daily to conserve its own body heat and to prevent drying of the skin. It is not put to the breast until it is able to nurse well from a bottle. Up to this time various means of feeding are used. An attempt is made to feed with a medicine dropper but if the infant will not swallow or vomits the feeding regular gavage is instituted. A premature infant will often retain a greater amount of food given by gavage than by medicine dropper or nipple, because both of the latter methods seem to excite a vomiting reflex in the pharynx. They furthermore favor aerophagia. The mother's breasts are expressed manually at regular nursing intervals to stimulate secretion. The expressed milk is fed to the baby by one of the above methods.

When a normal infant does not gain after the initial loss, or continues to lose weight, if he is nursing strongly, we do one of two

things to ascertain the amount of breast supply. We weigh the baby before and after feeding, or we express the breast after nursing, measure the amount and feed it to the baby. Sometimes it is best to combine these two methods. One or both will usually show where the trouble lies.

If there is a proved deficiency in the breast secretion, we do not hesitate to give the baby a complementary formula, even though this be necessary for a few days only. In complementary feeding a formula is given immediately following each breast nursing in contradistinction to supplemental feeding in which the formula supplants one or more breast feedings. Complementary feeding is preferable because the regular nursing efforts of the child best stimulate breast secretion. Complementary feedings are given without hesitation because we believe that this newborn period is a very important one from the standpoint of nutrition. Pediatricians the country over are coming to feel that babies of all ages, normal and otherwise, have been largely underfed in the past, and that they need and can use in the proper form more calories than it has previously been the custom to feed. This is true during the newborn period, as well as in later infancy. A large percentage of newborn babies in this clinic are given complementary feedings at some time in the newborn period. This is simply in line with the newer scientific knowledge of infant nutrition and metabolism. The complementary feeding is not kept up beyond the time when it seems that the breast is sufficient, as evidenced by the refusal of the formula, or continued gain in spite of its withdrawal for twenty-four to forty-eight hours. Sometimes the formula is needed only for four or five days. Sometimes it can be discontinued soon after discharge from the hospital. The return of the mother to normal conditions of health, routine and environment often serves to increase the breast secretion up to the amount sufficient for the infant, but we believe that in the early days of adjustment of mother and child to new conditions any insufficiency of breast milk should be complemented by a suitable formula, in order that the child may be assured of adequate food.

Obstetricians as a rule are loath to use artificial feeding unless absolutely necessary, and then they tend greatly to underfeed. The standard formula for a newborn infant in the first two weeks has long been of this order: one-third milk, two-thirds water, with one-half ounce of cane sugar, dextri-maltose or lactose. In using ordinary sweet cow's milk dilutions we have used half-and-half dilutions in the first week, increasing to two-thirds milk after the seventh to tenth day. A larger percentage of sugar, and, therefore, more calories can be given if some form of dextrin-malt sugar is used; as this ferments less easily than other sugars. The simplest and cheapest form of malt sugar is ordinary Karo corn syrup, which contains one

ounce by weight of sugar to the fluid ounce of syrup. This is used in 50 per cent dilution to facilitate mixing.

The use of Bulgarian, or lactic acid milk as infant food has become increasingly popular in the last few years, at least in older infants. On the infant wards of the St. Louis Children's Hospital it has practically displaced sweet cow's milk in the feeding of sick infants. We have been feeding lactic acid milk to newborn infants for the past year both wholly and complementally. At first we used this Bulgarian milk in the same dilutions as sweet milk but we have found it so well tolerated that we now use it undiluted from birth. Its efficacy seems to be due mainly to its lowered buffer action. The formula used as a routine in the nursery is as follows: Whole lactic acid milk, 10 oz.; 50% Karo Corn syrup solution, 2 oz. The whole lactic acid milk formula is prepared as follows: The commercial syrup is diluted with an equal amount of boiled water. Two ounces of this solution is added to 10 oz. of whole lactic acid milk as it comes from the dairy, and the whole divided into 6 feedings of 2 oz. each. There is no cooking required. The milk is warmed to body heat by immersing the bottle in warm water just before feeding.*

Two case reports are given to illustrate the methods used.

1. Baby Hahn, a normal full term infant of 8.5 lbs. was given a formula on the fourth day (see Fig. 1) because the breast secretion had not begun. This was discontinued on the seventh day because there seemed to be adequate breast milk, and the baby was not taking the formula, but after two days the formula was again given because by weighing before and after breast feeding it was found that the baby was getting very little from the breast. The weight curve from then on to discharge was normal.

2. Baby Brown, a normal full term infant weighing six pounds, was artificially fed from birth because its mother was operated upon immediately postpartum for empyema. The baby was started on the third day on a formula of undiluted lactic acid milk 10 ounces, 50% Karo syrup 2 ounces, six feedings of 2 ounces. He took this without vomiting, diarrhea or other disturbances with a gradual gain in weight. This was increased in amount and sugar content until at discharge at the age of eight weeks the baby was taking the following formula: Undiluted lactic acid milk 25 ounces, 50% Karo syrup 5 ounces, (i.e., 2.5 ounces of sugar) 6 feedings of 5 ounces. The discharge weight was 9 pounds, a gain of three pounds in eight weeks. (See Fig. 2.)

In order to arrive at a conclusion as to the advantages of the plan outlined above a comparison has been made of 100 unselected consecutive cases from the ward nursery before the adoption of the new regime and 100 unselected consecutive cases since the new plan was adopted. The results are summarized in Chart I. The routine complementary feeding under obstetrical supervision alone was usually one-third cow's milk, two-thirds water with half an ounce of cane sugar or dextri-maltose. The first point of interest is that under the

*For more detailed explanation of the rationale of lactic acid milk in infant feeding see Marriott, Jour. Am. Med. Assn., Oct. 18, 1919, lxxiii, 1173. Marriott and Davidson, Jour. Am. Med. Assn., (in press).

new regime of joint supervision and in line with the policy of giving the newborn infant adequate food, a much larger percentage of infants have been given complemental feedings than was formerly the case. At no time has there been any attempt to forestall initial loss except where it has been continued beyond the normal limits due to delayed lactation or other causes, and in cases of prematurity, nor have we tried to actively force feeding by withdrawing an infant from the breast fed class into the artificially fed. The idea has simply been to give adequate food. Analyzing the figures further as to birth weights and discharge weights it is seen that under the old regime the breast fed infants at discharge lacked on an average 111 grams of their birth weights, those complementally fed 201 grams of their birth weights, or an average deficit for the whole series of 138 grams. Under pediatric supervision and the feeding of undiluted lactic acid milk the breast fed infants lacked 43 grams of their birth weight at discharge, the complementally fed 80 grams, or an average deficit of 63 grams for the series. In other words, the deficit has been decreased by approximately one-half. In the infants who required complemental feeding the gain per day has been practically doubled, 36.1 grams per day as against 19.9 grams.

CHART I

	OBSTETRICAL CONTROL		DUAL CONTROL	
Number of Cases	100		100	
Breast Fed Exclusively	71		46	
Complemental Feeding	29		54	
	BREAST.	COMP.	BREAST.	COMP.
Average Birth Weight	3405	3087	3463	3307
Average Discharge Weight	3294	2886	3420	3227
Average Deficit (Gm.)	111	201	43	80
Average Deficit—Breast and Complemental Combined	138		63	
Number of Days on Formula	8.9		7.2	
Average Gain per Day (Gm.)	19.9		36.1	

We have in the Washington University Dispensary a Well Baby Clinic which is a unit in the system of municipal feeding clinics of the City of St. Louis. This clinic is conducted by the resident of the St. Louis Children's Hospital—the same man who has supervision of the newborn service in the hospital. All babies discharged from the nursery are seen by him in the clinic at least once, and in most cases twice, before they are sent to the neighborhood clinics. Those entirely breast fed return at the age of six weeks, at which time the mother is also examined in the obstetrical clinic and discharged if her condition is satisfactory. Those complementally or artificially fed are seen one week after discharge and thereafter as often as is deemed necessary. The mothers are assisted to the clinic, if necessary, by a special social worker for infants. This worker, who is also

a graduate nurse, regularly visits the home on the morning after the baby is discharged from the nursery, to direct and assist the mother in making up the first formula. Thus continuity of observation and treatment is maintained.

This plan of cooperative supervision of the newborn continued after discharge in the obstetrical and well baby clinic has been found most helpful and advantageous to mother and child. It has served the further academic purpose of acquainting the resident staff of the Children's Hospital with the care and management of the newborn infant, a service which finds no place in the ordinary children's hospital. Out of this has developed during the past school year a short course of six weekly lectures and demonstrations to fourth year medical students. This is given during the time the students are doing their practical obstetrical ward and outpatient work and just precedes or follows their fourth year practical work in pediatrics and infant feeding. This short course thus forms a link in correlating the work in obstetrics and pediatrics which has not heretofore been possible. The course is planned generally to emphasize to the student the more important factors and details in the care and management of the newborn and in the diagnosis and treatment of abnormal conditions arising during that period. No attempt is made to cover the whole field in detail; the following important topics are taken up:

1. Immediate care of the newborn infant, including methods of resuscitation, ligating of the umbilical cord, toilet of the skin, prophylactic treatment of the eyes, suitable clothing, etc. Treatment of chemical and bacterial conjunctivitis. Care of the umbilical stump, treatment and prevention of umbilical hernia.

2. Diagnosis and treatment of birth injuries, especially intracranial injuries and intracranial hemorrhage.

3. The physiology of lactation. Difficulties in nursing on the part of mother and infant. Care of the breasts during pregnancy and the puerperium, and treatment of abnormal conditions of the breasts and nipples. Routine and technic of breast feeding. Food and water requirements of the newborn, etc.

4. Indications for complementary feedings and consideration of kind, quantity and routine of administration.

5. Care of the premature infant.

6. Discussion of such conditions as icterus neonatorum, transitory fever, pylorospasm, skin diseases, exanthemata, hemorrhagic disease of the newborn, atelectasis, congenital malformations, syphilis and tuberculosis.

OBSERVATIONS ON THE VIABILITY OF THE MAMMALIAN OVUM*

BY CARL HARTMAN, PH.D., GALVESTON, TEXAS

Department of Zoology, the University of Texas.

IN January, 1921, the writer performed the following experiment in order to determine the time required for the opossum ovum to traverse the fallopian tube. In the experiment the successful attempt was made to "mark" an egg and recover it after a given time from the uterus.

A suspension was made in physiological saline solution of *Ascaris lumbricoides* from pigs. To free the eggs of their gelatinous matrix, the worms were killed and allowed to decay for two or three weeks. The exceedingly resistant eggs of course remained intact (Fig. 3) and were thoroughly washed in successive changes of salt solution.

The next step was to find a female opossum in heat or immediately after ovulation. This was rendered relatively easy by the employment of Stockhard and Paponicolaou's¹⁰ vaginal smear method of diagnosing the events of the oestrous cycle. In the opossum at oestrus the smear shows a pure culture of cornified cells without admixture of leucocytes or epithelial cells. At 5:10 P. M., Jan. 12, a laparotomy was performed on animal No. 566, which was found to have just ovulated. About a cubic centimeter of the suspension of round-worm ova was placed under the fimbriated end of each oviduct. At 5:00 P. M. the next day one uterus† was removed. It contained eggs with clear albumen and shell membrane and the ova in the center of the eggs were already slightly degenerated. Sixteen hours later the animal was killed and the remaining uterus removed. It contained eggs similar to the first batch, but somewhat fragmented and more degenerated; and one of the eggs had within the albumen layer an *Ascaris* egg (A, Fig. 1). This egg was therefore recovered forty hours after the *Ascaris* eggs were injected. But it reached the uterus in less than twenty-five hours; for the ova of the opossum are always discharged from the two ovaries at the same time, reach the uteri at the same time, and are identical in appearance, whether fertilized or unfertilized. No exceptions have been noted among the hundreds of batches and thousands of eggs removed from these animals by the writer.⁶ It therefore follows that the tubal journey is made in about twenty-four hours. Among mam-

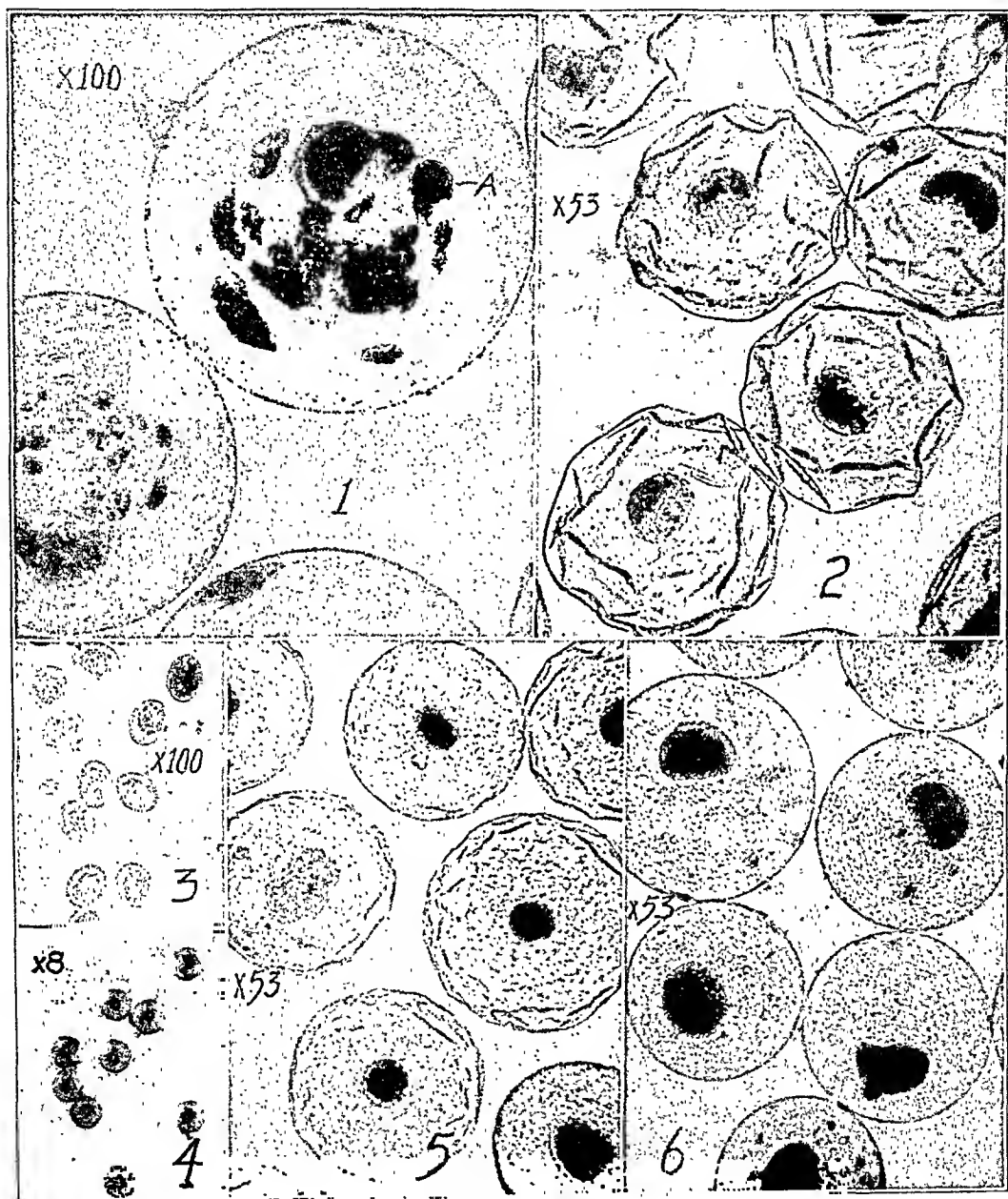
*Contribution from the Department of Zoology, the University of Texas, No. 164.

†Marsupials have two uteri (uterus duplex), hence the generic name *Didelphys* for opossum. Atavistically this condition occasionally occurs in man.

The eggs of marsupials possess an albumen layer and a shell-membrane, homologues of similar structures in the eggs of birds and reptiles.

mals the opossum holds the record for the rate of passage of the eggs through the oviduct. This short period of a single day is sufficient, too, to cause generative changes to be noted within the ovum.

The writer has considerable further data corroborative of the findings described above. Several examples must suffice.



Figs. 1—6.

No. 521 exhibited ripe, bulging follicles on Jan. 21 when a laparotomy was performed. 42 hours later eggs considerably degenerated were found in the uteri (Fig. 4).

No. 837 was seen to copulate at 4:00 A. M. Jan. 23; at 3:00 P. M. the next day 17 eggs were removed from the left uterus and 3 from the tube. These eggs were already much affected by degenerative changes (Fig. 2). In this case it is highly probable that copulation had taken place too late for fertilization.

No. 762. Jan. 25, oestrus was indicated by a suspension of cornified cells in the vaginal smear. The next day these appeared in clumps; the animal was killed. The somewhat flattened, therefore slightly degenerated, eggs shown in Fig. 5 were removed from the uteri.

No. 798. Data practically as in preceding. The eggs are shown in Fig. 6.

Further evidence of the rapid transit of the opossum egg from ovary to uterus is furnished by the condition of the fertilized eggs when they first arrive; they are still in the pronuclear stage, whereas in most mammals the egg has attained several divisions and two to three or more days have passed when the eggs reach the uterine horns.

In the opossum fertilization must needs take place in the upper end of the fallopian tube; for as the ovum passes down the tube albumen in great thickness and the shell membrane are added to it and offer impenetrable obstacles for the spermatozoa that may be present in the oviduct.

It is probable that in all mammals fertilization takes place in the upper third of the fallopian tube.⁷ It is possible that fertilization *must* take place there if this has not already occurred in the periovarial space. The data on the opossum egg, considered in connection with observations about to be mentioned, argues for a low degree of viability of the mammalian ovum generally. It is possible therefore that the oöcytes of Eutherian mammals are also no longer capable of conjugation with the sperm after a day's sojourn in the tube.

Unfertilized ova of mammals have been little studied. Sobotta⁹ briefly discusses the fate of the unfertilized mouse egg. The eggs remain in the oviduct for three days and during this time undergo no fragmentation but show signs of degeneration such, as for example, a concentration of deutoplasm in the center of the ovum. Bisehoff¹ finds degenerating ova in the uterus of a non-pregnant sow. The eggs are segmented but are abnormal as indicated by the dull appearance of the nuclei (exactly as in the opossum) in contrast with the clear vesicular nuclei of fertilized eggs in cleavage. Corner and his students,^{2 3 4 5} however, have recently studied hundreds of non-pregnant as well as pregnant sow uteri in early stages after ovulation. Corner⁴ speaks of finding unsegmented ova along with young small embryos; and in pseudopregnant sows seven days after heat the uterus contains "unsegmented" ova, which are, however, described as very degenerate. The author, not especially interested at the time in the unfertilized eggs, fails to state definitely when the first signs of degeneration appear.

The matter was submitted to the experimental test by Lewis,⁸ also working on the sow. This worker bred sows at various times after the oestrous period. He first had to determine the relation of oestrous to ovulation. He found that ovulation in the sow occurs about thirty hours after the first manifestations of heat; and with this Corner and Amsbaugh's⁵ findings agree. The egg, therefore, starts down the tube near the end of the oestrous period. Lewis bred each of thirteen sows

out of heat a total of thirty-four times. In seven of these cases services were given on the first day after the period of heat had passed, with positive results in only two cases. Not a single pregnancy resulted from service after the first twenty-four hours after the period of heat had passed.

It seems clear, then, that the egg cannot wait long for the spermatozoa—these must be on hand when ovulation takes place. It seems probable that hours, not days, measure the delay that results in sterile coitus.

REFERENCES

Bischoff, Th. L.: Sur la maturation et la chute périodique de l'oeuf de l'homme et des mammifères, indépendamment de la fécondation. *Ann. des sci. nat.* III. Sér., Vols. I and II, 1844. *Corner, G. W.*: Maturation of the ovum in swine. *Anat. Rec.*, Vol. 26, pp. 117-183, 1917. *Corner, G. W.*: Internal migration of the ovum. *Johns Hopkins Hosp. Bull.*, Vol. 32, pp. 78-83. *Corner, G. W.*: Cyclic changes in the ovaries and uterus of the sow, etc. Publication No. 276 of the Carnegie Institution of Washington, 1921. *Corner, G. W., and Amsbaugh, A. E.*: Oestrus and ovulation in swine. *Anat. Rec.*, Vol. 12, pp. 287-291. *Hartman, Carl G.*: Studies in the development of the opossum, Parts III and IV. *Jour. Morph.*, Vol. 32, pp. 1-142, 1919. *Huber, Carl G.*: The development of the albino rat. *Jour. Morph.*, Vol. 26, pp. 1-142, 1915. *Lewis, L. L.*: The vitality of reproductive cells. *Bull. No. 96*, Okla. Ag. Exp. Sta., Stillwater, Okla., Dec., 1911, 47 pp. *Sobotta, J.*: Die Befruchtung und Furchung des Eies der Maus. *Arch. f. mikr. Anat.*, Vol. 45, pp. 15-92. *Stockard, Charles R., and Paponicolaou, Geo. N.*: The existence of a typical oestrous cycle in the guinea pig. *Am. Jour. of Anat.*, Vol. 22, pp. 225-284, 1917.

THE VALUE OF CERTAIN GYNECOLOGICAL OPERATIONS

BY HOWARD K. TUTTLE, M.D.,* SO. ANCON, MASS.

Assistant Chief of Surgical Clinic.

(From the Surgical Clinic of Ancon Hospital.)

THE records of Ancon Hospital from 1904 to 1922 inclusive show that 2792 patients have been operated on for gynecological conditions requiring more than simple dilatation and curettement of the uterus. The total number of operations performed was 4881, 810 being extraabdominal and 4071 intraabdominal. It has been possible to study the results of various operative procedures more or less thoroughly through readmissions to the hospital.

Of the total number of 1173 white women, 456 or 38.8 per cent have one or more readmissions to hospital, and of these, 288 or 63.1 per cent were for gynecologic or obstetrical conditions. Of the total number of 1619 black women, 191 or 11.8 per cent have readmissions, and of these, 99 or 51.8 per cent were for gynecologic or obstetrical conditions. It is readily seen that the white woman becomes a much more frequent visitor to the hospital following operation than does the black woman. We believe this is due to the more constricted financial circumstances, more phlegmatic nervous system, and that the

*Read before the Canal Zone Medical Society, April 20, 1923.

black woman has received the benefit of more radical surgery especially in the treatment of the pelvic inflammatory diseases.

To facilitate the study, the various operations have been divided more or less loosely into groups, and in order that the results may be presented with reasonable brevity, conclusions must necessarily constitute the greater part of this paper.

Group 1. Operations of Repair

Simple perineorrhaphy has been performed on 288 patients and complete perineal repair with suture of the sphincter ani muscle on 21, a total of 309. Readmissions have followed in 110 instances and show that 23 patients have subsequently been confined, with forceps delivery in one case and with a recurrence of the vaginal relaxation in four patients. During the earlier years covered by this study, the denudation operation of Emmett was used extensively, but since Haynes¹ brought out his modification of the Tait flap-splitting operation in 1908, this latter operation has been used entirely. The operation must not be taken too lightly as shown by the record of three deaths following the Emmett operation from hemorrhage and surgical shock. As used at the present time, allowing at least six months for the tissues to heal and contract, the operation is one of relative safety and the results most gratifying.

It is our opinion that if the vaginal relaxation is such as to cause annoying symptoms, it should be repaired as soon as the tissues will permit operation, and that with careful obstetrical supervision, subsequent labors will cause very little difficulty.

Insufficient numbers of vesicovaginal and rectovaginal fistulae have been seen to draw definite conclusions. However, it would seem that successful closure will follow in at least 75 per cent of uncomplicated fistulae provided proper separation of tissue is done with suture in layers. Rectovaginal fistulae, complicated by ulceration and stricture of the rectum, usually of luetic origin, seen most frequently in negroes, are practically impossible to cure by operation, even following intensive antisyphilitic treatment.

Operations for acquired vaginal atresia are far from satisfactory, and like strictures of other parts, require continued observation and divisions.

Trachelorrhaphy has been performed on 216 patients, 97 of whom have been readmitted to hospital. Twenty-three have had subsequent confinements, with forceps delivery necessary in three instances, and recurrence of lacerations requiring repair in five cases. Eight patients had subsequent abortions. Postoperative menstrual disorders were noted in eight patients and were entirely confined to white women.

Amputation of the cervix has been used in 72 cases and 27 have been subsequently seen. Seven have been confined, four have aborted, and four have required operation on account of recurrence of the original condition.

From the small number followed it would seem that there is little choice between these two operations as regards subsequent pregnancies and confinements. Menstrual symptoms are more frequent following trachelorrhaphy, while abortions are seen oftener after amputation of cervix. Neither operation should be performed during the child bearing age unless clear cut indications are present that are not amenable to palliative measures.

Group 2. Operations for Displacements

The Dudley plastic operation on the posterior cervical lip has been performed on 21 patients, 10 of whom have been followed. Four have subsequently been confined. Retrodisplacement followed confinement in two instances, while dysmenorrhea and recurring ante flexion were each noted in one case.

From this small group of cases it would seem that this operation has a distinct field in cases of ante flexion associated with sterility and dysmenorrhea.

The retrodisplacements fall into certain more or less distinct classes.

1. Those apparently congenital in origin, nonadherent, and associated with sterility.

2. Those following pregnancy and birth injuries of the vaginal outlet.

3. Those associated with pelvic inflammatory disease and adhesions.

Those of the first class are relieved by suspension alone; the second class require perineal repair with the suspension; while the treatment of the third class frequently becomes that of the pelvic inflammatory condition.

Crossen² cites 110 different operations for the relief of these conditions, and it should scarcely be necessary to add that none are entirely satisfactory. The intraabdominal round ligament shortening described by the late John B. Murphy,³ for which he claimed no originality, but had used for many years, is the operation most often performed in this Clinic for retrodisplacement. It is an anterior-posterior plication of the round ligaments over the fundus of the uterus. It has been used on 1074 patients, of whom 350 have been followed. Forty-six have had subsequent confinements, forceps delivery being necessary in two cases. Eighteen have had abortions. Simple retrodisplacement has recurred in nine, adherent displacement in five, while prolapse has followed in four instances, a total of 5.14 per cent recurrences among the followed cases.

Its advantages are: It is simple, and efficient in a large per cent

of cases. It is safe for the child bearing period. It leaves no bands or pockets for the formation of intestinal twists and herniae.

Its disadvantages are: A certain number of displacements will recur following pregnancy and inflammatory conditions. Care must be used that the tubes are not kinked near their attachment to the uterus. Overestimation sometimes occurs, causing dysmenorrhea of acute ante flexion. There is a slight increase in the liability of abortion.

The Baldy-Webster technic has been used in 31 cases; it seems especially useful in those cases of retrodisplacement accompanied by prolapse of the tubes and ovaries. Its disadvantages are a liability to recurrence due to placing the round ligaments too low on the posterior uterine surface; increase in varices of the broad ligament; and possibility of hernia of intestines through the openings in the broad ligaments as reported by Richardson.⁴

The anterior round ligament plication of Coffey has been used on 12 patients; this operation appears anatomically and physiologically correct and seems especially well adapted for cases of simple retrodisplacement reasonably certain of future child bearing. We have seen no bad results from this operation.

The operative treatment of prolapse of the uterus is dependent on several factors:

1. Extent of the prolapse.
2. Age of the patient.
3. Desirability for future pregnancies.
4. Complications.

With partial prolapse in a woman within the child bearing period desirous of further pregnancies, the operative procedure is a perineal repair and one of the intraabdominal round ligament suspensions. It may be necessary to add an amputation of cervix and plastic work on the anterior vaginal wall in case of elongated cervix and cystocele. This may be called conservative treatment, in no way preventing further child bearing, but with a possibility of recurrence following subsequent confinements. With complete prolapse, and future child bearing eliminated, various intraabdominal fixations and suspensions, supravaginal hysterectomies of various technic, vaginal plastic operations, vaginal ligament operations, the Watkins transposition operation, and vaginal hysterectomies have been used in this Clinic.

In 1919 Freeman⁵ devised a method of ventrofixation in which he used a strip of fascia lata passed through the fundus of the uterus and anchored on either side to the fascia of the rectus sheath.

Dr. Earhart, Chief of this Clinic, has modified Freeman's operation by using strips of fascia cut from either side of the low median abdominal incision and left attached at their lower ends. These strips

of fascia are passed through the fundus of the uterus from their respective sides, tied or sutured over the fundus, and their ends anchored to the rectus sheath. The advantage of this operation over that of Freeman is at once apparent.

Sterilization by resection and burying the ends of tubes in the broad ligament should be done with all fixation operations where there is a remote possibility of future pregnancy. The treatment of prolapse complicated by fibroids, pelvic inflammatory disease, or ovarian tumors becomes that of the complication in many instances.

Group 3. Operations for Uterine Fibroids

The operative treatment of uterine fibroids is myomectomy or some form of hysterectomy. Myomectomy has been performed on 52 whites and 47 blacks, of these, 15 whites and 7 blacks have been readmitted. Pregnancy has followed in two cases; fibroids have recurred in three instances. The following types of hysterectomy have been performed and followed:

Supravaginal, simple	6 White	37 Black	2 W	4 B
“ with complete removal of adnexa	36 “	213 “	0	1
“ one ovary remaining in situ	18 “	29 “	1	0
“ both ovaries remaining	3 “	10 “	0	1
“ unilateral adnexa remaining	2 “	5 “	0	0
Panhysterectomy, adnexa removed	2 “	8 “	0	1

Endocervicitis, 1; ovarian cyst, 1; neurasthenia, 1; and malignant disease of the ovary, 1, were noted among the followed cases.

Myomectomy is indicated in cases of uncomplicated pedunculated fibroids at any age. In young women desirous of future pregnancies, with small multiple fibroids, easily accessible, uncomplicated by pelvic inflammatory disease, myomectomy is the operation of choice.

A large per cent of fibroids are complicated by chronic pelvic inflammatory disease, especially in negroes. Supravaginal hysterectomy with complete removal of adnexa is indicated in these cases.

It is wise to leave the adnexa *in situ* in women under 35 years, provided they show no evidence of adnexal disease. Tubes and ovaries should be left unmolested if possible. Removal of tubes is liable to interfere with ovarian blood supply, later causing cysts of ovaries left *in situ*. The practice of leaving a single ovary or a portion of an ovary is probably of little or no benefit.

Group 4. Operations for Pelvic Inflammation

This group contains a total number of 1165 cases of various pelvic inflammations, with the operative findings showing the ovaries uninvolved in 397 or 34 per cent. Operative procedures fall into three classes; those classified as radical where both functions of menstruation and reproduction are lost. The various hysterectomies fall in this class, as does a small sub-division, those cases where bilateral

salpingo-oöphorectomy has been done with the uterus remaining *in situ*. This latter procedure is unsurgical and not to be recommended. The second class may be called conservative where both menstruation and reproduction may be retained. In this class the parts removed are removed entirely as in unilateral salpingectomy or salpingo-oöphorectomy. The third class may be styled the ultra-conservative, the gynecologic patch work, or trying to make something out of nothing, and includes the partial resections of tubes and ovaries, stomatoplastic operations, etc.

A total of 585 operations of the first class were done; 66 patients were followed and 7 were readmitted for gynecologic conditions, or 1.2 per cent of the total cases. Causes for readmission were neurasthenia in one, recurring ovarian cyst in two, bladder symptoms in one, wound hematoma and infection in one each, and ventral hernia in one.

Two hundred ninety-four operations of the second class were performed; 67 of these were followed and 34 were readmitted for gynecologic conditions. Three were admitted for confinement and three for abortions. Recurrence of the inflammatory condition was noted in 9.5 per cent.

Three hundred ten operations of the third class were performed, including 87 cases of posterior vaginal puncture with drainage. Ninety patients were followed, 83 being readmitted for gynecologic conditions. Six of these were for confinement and one for abortion. Recurrence occurred in 24.5 per cent of these cases. Pregnancy followed posterior vaginal puncture with drainage in four, resection of tubal cyst in one, and unilateral stomatoplasty in one. The abortion followed resection of tubal cyst.

From our study of the pelvic inflammatory group we draw these conclusions:

1. Local operations, as removal of unilateral adnexa, should only be performed when disease conditions are sharply localized.

2. The patch work gynecology is usually time wasted and pregnancy follows so rarely that these operations should only be used in exceptional cases.

3. Vaginal puncture and drainage for pelvic abscess will relieve symptoms and prevent recurrence in slightly more than half the cases. It is a useful operation in acute suppurative pelvic disease and pregnancy will occasionally follow in these cases.

4. With both tubes and ovaries involved in suppurative disease, or diffuse pelvic inflammation with adhesions or cystic formation, supra-vaginal hysterectomy with complete removal of adnexa is the best operative treatment regardless of age.

5. Ruptured pyosalpinx occurs in about 1 per cent of pelvic inflammatory cases and with immediate operation and drainage the mortality should not exceed 10 per cent.

6. Drainage through the culdesac of Douglas is indicated in all cases where pus has been spilled in the pelvis. Abdominal drainage is used only when it is impossible to drain through the culdesac. Large quarantine packs and Mikuliez's drains through the abdomen are unnecessary and frequently followed by hernia.

Group 5. Operations for Ectopic Pregnancy

A paper on "Extrauterine Pregnancy" consisting of a review of 101 ectopic pregnancies in Ancon Hospital from 1905 to 1921 inclusive was presented to this Society in 1922. Our total of ectopics has now reached 117. During the past year two cases of this group were of unusual interest.

1. A woman who had had both tubes and one ovary removed at another hospital, was operated on here twenty months later and an ovarian pregnancy removed.

2. A woman operated on for ruptured tubal pregnancy of the right side, showed an unruptured ectopic of the left tube, apparently of different age.

Group 6. Operations for Benign Tumors of the Ovaries

Tumors are classified as follows:

1. Small cystic degeneration.
2. Unilocular cysts.
3. Multilocular cysts.
4. Dermoids.

Twenty-four and one-half per cent of all cases showed bilateral involvement, and about 30 per cent were so intimately associated with pelvic inflammatory disease that the treatment became that of the complicating condition.

With ovarian disease uncomplicated by inflammatory conditions, it has been the policy to save as much as possible by conservative operation. If it becomes necessary to sacrifice both ovaries, a supravaginal hysterectomy is the operation of choice. Eight hundred twenty-seven patients have had conservative operations on the ovaries. Of these, 226 followed cases showed recurrence of cystic disease in 16 or 7 per cent. Nine of these recurrences occurred in cases complicated by chronic pelvic inflammatory disease.

Group 7. Operations for Malignant Disease of the Female Genital Organs

The findings of this group are most disheartening. Operations have been palliative, as excisions and cauterizations, and radical, with complete removal of pelvic organs. Of 41 cases, 11 have been followed, and one five year cure is the result.

The operability is extremely low, especially among the blacks and

it is rare one comes for examination before the vault of the vagina is filled with carcinoma.

Authentic cures by radium are yet rare; there seems to be no question that hemorrhage and sloughing are much lessened and life prolonged and made more comfortable by its use.

Group 8. Cesarean Section

The records show six vaginal, 52 abdominal, and one Porro operation. Thirty-four cases of eclampsia have been treated by cesarean with a mortality of 29.4 per cent. Of 17 cases followed, eight have had subsequent confinements, two by cesarean, three by forceps, and three with normal labor.

Group 9. Operations for Miscellaneous Conditions

Tuberculous disease of the pelvic organs has been noted as follows: Tubes alone, 5; Ovary alone, 1; Tubes and ovaries, 5; Endometrium, 2.

Radical pelvic surgery is indicated for this condition; the leaving of an ovary or portion of an ovary is likely to result in cystic degeneration with adhesions. The prognosis in these cases is good provided the source of infection can be eradicated.

Appendectomy has been performed in 762 cases in this series, 508 of whom were whites and 254 blacks. Pathologic reports show chronic appendicitis in 218 whites and 85 blacks, and acute appendicitis of various types in 42 whites and 39 blacks. Tuberculous appendicitis was noted on one occasion in a black.

Cholecystostomy has been performed on 17 and cholecystectomy on 5 cases.

Various other intestinal operations associated with the pelvic operations were: Colostomy or enterostomy, 3; Closure of fecal fistula, 1; Resection of rectum, 3; End to end intestinal anastomosis, 5; and Diverticulectomy, 2.

One of the most discussed subjects in gynecologic surgery is the choice of type of hysterectomy and the resulting artificial menopause.

Regarding vaginal hysterectomy, Graves⁶ says, "As compared with a properly executed abdominal hysterectomy, the extirpation of the uterus per vaginam has no advantage. It cannot be done more rapidly, and there is no less shock or loss of blood, though claims to the contrary are sometimes made. Vaginal hysterectomy is useful in some types of operation for procedentia."

Crossen⁷ reserves vaginal hysterectomy for certain types of prolapse with small fundus, and cases of small fibroids uncomplicated by inflammatory disease where it is possible to deliver the uterus through the vaginal incision.

Hirst and Mazer,⁸ writing on prolapse of the uterus, state that "it is a grave mistake to perform either abdominal or vaginal hysterectomy

tomy as a cure for prolapse, unless the uterus is so diseased as to make its removal imperative for that reason. The uterus is the best possible support to retain the protruding cystocele, and no other structure, whether broad ligaments or vaginal fascia, will satisfactorily take its place."

There are those who advocate the use of panhysterectomy in preference to the supravaginal variety and cite as arguments the recurrence of chronic endocervicitis in the stump, the recurrence of cervical fibroids, and the later occurrence of carcinoma of the cervix. In a total of 816 patients having supravaginal hysterectomy, 91 have been followed. Two patients have returned for persistent endocervicitis, cancer has developed in the cervical stump in one instance, while there is no record of recurrence of cervical fibroid.

Taking into consideration the greater ease in performing supravaginal hysterectomy, the better pelvic support it affords, and the lower mortality, it is apparent that panhysterectomy should be reserved for those cases of pelvic malignancy where radical operation offers a chance of cure, for those borderline cases with diseased cervix that are likely to become carcinomatous, for pelvic tuberculosis with involvement of the endometrium, and for certain cases of fibroids involving the cervix.

Forty-one white and four black women have been readmitted to hospital with severe nervous symptoms subsequent to the following operations:

Hysterectomy, supravaginal, complete removal of adnexa	3
Hysterectomy, supravaginal, with one ovary retained	7
Conservative operations of the ovaries	11
Conservative operations of the tubes	7
Operations for displacements	8
Operations of repair	9

Close scrutiny of the records show most of those with postoperative neurotic symptoms to have had a decidedly nervous temperament preceding the operation. We admit that operation often aggravates these symptoms and that great care should be exercised in advising operation for this class of cases. We believe that castration in the adult woman has been overestimated as the cause of these nervous conditions, and our records tend to show that incomplete, conservative surgery is a much more frequent cause.

We have had no readmissions for atrophy of the external genitals following castration, and believe this condition, severe enough to cause distressing symptoms, to be rare.

Operative accidents were noted as follows:

Sponge or gauze in the abdomen	4
Wound of bladder	5
Wound of rectum	4
Wound of intestines	2
Wound of ureters	5

Postoperative complications were seen as follows:

Pelvic abscess	16	5.6 per 1000
General peritonitis	10	3.6 " "
Fecal fistula	11	3.9 " "
Wound infection	85	3%
Hemorrhage	9	3.2 per 1000
Spontaneous rupture abdominal wound	11	3.9 " "
Phlebitis	9	3.2 " "
Pneumonia	4	1.5 " "
Acute gastric dilatation	5	1.8 " "
Surgical shock	8	2.8 " "
Embolism	2	0.7 " "
Acute intestinal obstruction	3	1 " "

DEATHS

The mortality rate of the entire series was 2.5%, 1.8% for whites and 3.1% for blacks.

CAUSE OF DEATHS BY GROUPS	1	2	3	4	5	6	7	8	9
Hemorrhage	2		1						1
Surgical shock	1			4					
Peritonitis, general		2	1	10	2			3	2
Acute intestinal obstruction		1							
Cerebral thrombosis		1							
Pulmonary tuberculosis		1							
Severe secondary anaemia			1						
Embolism			1	1					
Acute gastric dilatation			1						
Anuria			1			1			
Pneumonia			2						
Anaesthesia			1						
Rupture abdominal wound			1					1	
Hemophilia				2	1				
Septicaemia				1					
Pyæmia				2					
Pyosalpinx and fibroids				1					
Acute nephritis				1					
Syphilis					2				
Ruptured tubal pregnancy						1			
Ischio-rectal abscess							3		
Carcinoma cervix uteri							1		
Carcinoma ovary								7	
Eclampsia									1
General tuberculosis									
Total cases	240	683	316	1092	117	208	41	58	39
Total deaths	3	5	10	27	5	2	4	11	4
Total per cent deaths	1.25	.73	3.16	2.46	4.27	.96	9.75	18.96	10.8
Corrected per cent deaths*	1.25	.58	3.16	2.29	4.27	.48	9.75	7.84	7.89

*2—Pulmonary tuberculosis; 4—Acute nephritis; Syphilis; 6—Ischio-rectal abscess; 8—Eclampsia, 7; 9—General tuberculosis; Total corrected per cent of deaths, 2.11.

REFERENCES

- (1) *Cherry, Thos. H.*: Surg., Gynec. and Obst., June, 1922, xxxiv, 803. (2) *Crossen, Harry Sturgeon*: Operative Gynecology, ed. 2, St. Louis, 1920, C. V. Mosby, pages 33 to 96. (3) *Murphy, John B.*: Clinics of John B. Murphy, M.D., Feb., 1916, v, 21. (4) *Richardson, Edward P.*: Surg., Gynec. and Obst., July, 1920, xxxi, 90. (5) *Freeman, Leonard*: Surg., Gynec. and Obst., Nov., 1919, xxix, 511. (6) *Graves, W. P.*: Gynecology, ed. 2, Philadelphia, 1921, Saunders, p. 728. (7) *Crossen, Harry Sturgeon*: Operative Gynecology, ed. 2, St. Louis, 1920, C. V. Mosby, p. 167 to 170, p. 303. (8) *Hirst, John Cook, and Mezer, Chas.*: AM. JOUR. OF OBST. AND GYNEC., March, 1923, v, 229.

THE OCCIPUT POSTERIOR*

BY PAUL T. HARPER, M.D., F.A.C.S., ALBANY, N. Y.

CHOICE of the above subject is inspired by the conviction that from the standpoints of frequency of occurrence, difficulties encountered and responsibilities involved there is no condition more important than the occiput posterior. For this reason it has been chosen for presentation before the Section.

In what follows attempt will be made to establish the occiput posterior as a problem that is broad in that irregularities of uterine action and limitations of bony pelvis commonly enter and one that can be attacked more satisfactorily along the lines of active expectancy than along those of interference by the employment of empirical methods for the symptomatic cure of obstructed or unnecessarily prolonged labor.

It must be understood that the term occiput posterior is applied to cases in which the occiput is directed toward the rear as the presenting-part descends. Since descent occurs in late pregnancy or in early labor, the cases considered are those in which labor begins with the occiput directed posteriorly rather than anteriorly. They are cases in which the occiput posterior is a primary position. Included in this classification are two groups of cases. First, those in which the occiput, though primarily posterior, subsequently rotates anteriorly and is born; and, second, those in which either no attempt at anterior rotation is made and posterior position of the occiput "persists" or those in which anterior rotation, even though begun, is incompletely carried out.

There are two reasons for the general impression that the posterior is of infrequent occurrence. In the first place, statistics show that the occiput is "found to the front" in from 70 to 90 per cent of cases. This is true; for the majority of posteriors rotate anteriorly, and examinations made after rotation has well begun reveal the occiput in anterior position. Therefore, statistics based upon examinations made at indifferent times during labor, and particularly if late, are valueless in determining frequency with which the occiput, at the onset of labor, is directed posteriorly. Further, those based upon observations as to which direction and to what extent restitution takes place are not only valueless but often lead to the erroneous conclusion that the occiput was primarily to the front because restitution takes place through an arc of but 45°. Unless the shoulders are engaged at the

*Read before the Section of Obstetrics and Gynecology of the Buffalo (N. Y.) Academy of Medicine, February 21, 1923.

time of anterior rotation, they rotate as does the occiput, and restitution that follows is that characteristic of a primarily anterior position. It is only in the occasional case where shoulders are engaged at the time of anterior rotation that restitution, for reasons that are apparent, takes place through an arc of 135° .

Since each primary posterior is potentially a persistent posterior, statistics are of value and clinical course of the individual case can be followed intelligently only as they are based upon careful examinations made at the onset of or, at least, early in labor. Care with which examinations are to be made must be emphasized because association of deflexion sufficient to bring the chest wall forward and to make it possible for the fetal heart to be heard anteriorly is so characteristic of the posterior that the case is often incorrectly recorded as an anterior if diagnosis is based upon nothing more than the fact that heart is heard distinctly toward the front.

In the second place, the term posterior is applied by some authorities only to those cases in which posterior position persists. But so many primary posteriors undergo spontaneous anterior rotation that instances of persistence of the posterior position are relatively infrequent. Call only the latter "occiput posteriors" and a false impression of the actual frequency with which the occiput lies primarily to the rear is created. Literally the term "posterior" should be applied to the larger number of cases in which the occiput is directed posteriorly in the first place. "Persistent occiput posterior" then is reserved for a complication in the clinical course of the posterior. The term is descriptive of this complication and should be applied to it.

At this point it is insisted that primary position of the occiput is posterior in approximately 50 per cent of all cases, and it is believed careful observation will establish the truth of this contention to one's entire satisfaction. For reasons that will appear, R.O.A. is far more common than L.O.P.

L.O.A. may be termed the natural position. Long diameter of the head lies in the more available right oblique diameter of the inlet and the occiput is directed anteriorly because the convex back fits the concave anterior uterine wall. Further, it is "natural" for little anterior rotation is required of the occiput as it advances. But the head can lie as readily in the diameter mentioned with occiput to the rear as to the front; and such position will be assumed if a force tending to direct back of the child toward the maternal right flank were to be brought to bear upon it. Were the patient to lie on her right side, the child's back would be so directed because "ballotement" proves the child to be heavier than the fluid in which it is immersed. Were shoulders unengaged, occiput would follow back and the head would lie with its occiput directed posteriorly. Further, were

position of the head maintained as the mother resumed the upright position and were engagement to occur subsequently, a primary R.O.P. would be met at the onset of labor. On the other hand, were engagement not to occur, back and occiput might be redirected to the front, but the convex back merely accommodates itself to the anterior concavity of the uterus. There is no force holding it there; while, with the patient on her side, gravity actually displaces the child's body posteriorly unless previous engagement of shoulders holds its upper part (and the head) toward the front. The left-lateral posture can as readily become an important factor in assumption of the L.O.P. position.

Tendency of the back to gravitate toward the maternal right or left flank as the patient lies on one side or the other is emphasized for two reasons. First, it offers at least an explanation of frequency of the R.O.P. position, for the right-lateral is the posture that, late in pregnancy, is so commonly assumed by the mother. Few patients can sleep in the dorsal posture and increased respiratory embarrassment occasioned by the growing uterus makes the left-lateral posture far less comfortable, therefore less often unconsciously assumed, than the opposite. Second, it illustrates the wisdom of having the patient lie on the "opposite" side in attempt at correction of a posterior. Obviously, postural treatment of the kind is suited only to cases in which the presenting-part is either unengaged or simply resting in the pelvic inlet.

It is not claimed that posture in which the mother spends from six to eight hours out of every twenty-four determines position of the occiput. Were this the case there would be few L.O.A.'s for reasons that are apparent. Maternal posture is offered simply as a factor in assumption of the R.O.P. position. However, it is thought to explain more cases than the familiar "pendulous abdomen," "multiple pregnancy," "hydramnios" and the like that are inadequate as etiological factors in that they fail to account for a sufficiently large number of posteriors that are met. R.O.P. is of frequent occurrence; there must be clinical factors or forces that bring it about: and maternal posture is thought to be an important one.

It is possible to interpret correctly the clinical course of labor where the occiput is posterior and to attach proper significance to fairly constant physical signs only as certain fundamentals of mechanism of the posterior are understood. For this reason, mechanism, physical signs, and variations from the purely physiological that the posterior invites will be considered together.

The most striking physical characteristic of the child when the position is posterior is varying degree of deflexion, or bending backward, of the presenting-part. Postpartum evidence of this is invariably offered by presence of the caput well forward of the occiput,

the distance being an accurate measure of the amount of deflexion. Further, deflexion is known to be produced at the inlet when there is disproportion between its antero-posterior size and that of the presenting-part; and it invariably results when the head reaches the ample mid-pelvis. Deflexion has double significance. First, as a result of it, the attitude of universal flexion is departed from. Chin leaves the chest and the latter is directed forward and, therefore, toward the uterine wall making it possible for the foetal heart to be heard loudly over the anterior chest wall as well as through the back. Second, eccentricity of the advancing pole progressively diminishes as deflexion is increased until, with the head in mid-position (that is, neither flexed nor extended), it is concentric. Since anterior rotation requires at least some degree of eccentricity of the advancing pole, the movement is less perfectly carried out as the head is less completely flexed, even though contractions are efficient and the pelvic floor capable of exercising its anteriorly-directing force.

Further, to simplify discussion, the presenting-part will be considered as assuming one after another of four arbitrary positions along the birth canal as follows: (1) above the inlet, (2) in the pelvic inlet, (3) in the mid-pelvis, and (4) at the pelvic outlet.

(1) With the presenting-part above the inlet, engagement has yet to occur; and, therefore, though back and occiput are directed toward one of the four quadrants of the inlet or lie transversely, an actual "position" has not yet been assumed. However, probable position can be determined with at least a fair degree of certainty, although frequency with which apparent position changes before engagement occurs is a matter of common experience.

(2) With the head in the inlet, position becomes permanent regardless of whether engagement occurs in an oblique or in the transverse diameter. However, engagement in the latter diameter has an important bearing upon subsequent behavior of the presenting-part should the occiput be re-directed posteriorly as it reaches the ample mid-pelvis. The transverse is appropriated when antero-posterior shortening makes the obliques less available and such shortening occurs in simple flattening, a slight degree of which is the commonest pelvic abnormality met. This flattening is ordinarily of little clinical importance in primiparae because its degree is trifling and engagement as a rule occurs early when the head is not full-grown. But in late engagement characteristic of multiparity, the broad bi-parietal diameter of the full-term head is momentarily retarded by resistance the relatively or actually flattened inlet occasions, the fore part of the head advances, and a varying degree of deflexion results as the head passes the inlet. If slight, the presenting-part is said to be deflexed; if extreme, the face may even be made to engage and advance. How-

ever, deflexion characteristic of the posterior is alone to be considered at this point.

Continuation of forces that have deflexed the head causes it to advance and, at the same time, begins moulding and caput-production. The latter processes are of great clinical importance. As a result of them, the presenting-part is elongated in an attempt at adaptation of shape of head to that of the pelvic cavity. When sufficiently elongated, spontaneous correction of deflexion by the action of physiological forces is not to be expected, and even manual flexion of the head, though momentarily successful, is followed by resumption of the original deflexion when the artificial force is removed. It follows that the time to flex the head near the inlet is just as the latter's bony resistance is passed and before, or very soon after, moulding and caput-formation have begun.

Early physical signs may well be considered at this point. The dependable ones are elicited as a result of abdominal palpation and auscultation. It is only late in labor that increasing dilatation makes it possible to elicit with ease signs referable to the occiput itself. While there are several early signs that are of diagnostic value, there are two that are most dependable. They are, first, the presence of small, firm, rounded and movable masses indicating location of the feet and, second, the location in which the foetal heart is heard with maximum intensity.

Bearing in mind that, with the child in the attitude of universal flexion, feet and back are at opposite ends of the antero-posterior diameter of the foetal ovoid and that occiput and back are in line one with the other, it is apparent why presence of freely movable small parts above and just to the left of the umbilicus is one of the most dependable signs upon which the diagnosis of R.O.P. can be made. Here one should be able to locate the firm, rounded resistance the back offers in the right flank, but the placenta may give like signs. On the other hand, the feet cannot only be palpated but they can often be seen to move.

Heart sounds are heard with maximum intensity in the flank even in the presence of deflexion sufficient to bring the chest so far forward that heart beat can be heard on the opposite side toward the front. Because of frequency of posterior positions, diagnosis of occiput-to-the-front may not be made on location of strong heart sounds anteriorly. Rather, search for presence of sounds equally as prominent in the opposite flank, palpation of the presenting-part as it lies in the inlet for evidence of deflexion that explains the auscultatory findings, and determination of locations of feet and back if possible are essentials of diagnosis that may not be omitted. Were these simple precautions observed in every case, few posteriors would be missed and management of those met would be more satisfactory.

(3) With the presenting-part in the mid-pelvis, deflexion is invariably present. It is relative or absolute; it may be both. Size of plane of the advancing head is increased and its effect upon the clinical course of labor is unfavorable.

The amount of actual deflexion that results depends upon the manner in which the presenting-part passes the inlet. If well flexed because of uniform resistance encountered, associated moulding and beginning caput-formation can be counted upon to preserve the physiological attitude. The head is too elongated to unbend and it presents a well-developed and eccentric advancing pole. Each contributes toward spontaneous or relatively simple instrumental anterior rotation that is characteristic of cases of the kind.

However, if deflexion has occurred at the inlet, moulding is correspondingly less pronounced and the more or less rounded head eventually reaches the mid-pelvis the ample size of which invites deflexion. Cases of the kind are common in multiparity where, for reasons that will appear, little or no attempt at spontaneous anterior rotation may be made. The ease with which even large, unmoulded heads can be rotated manually in the mid-pelvis, provided they are sufficiently deflexed, is evidence of the ample space afforded for deflexion.

Relative deflexion on the other hand has to do only with relation between long diameter of the head and general direction of the birth-canal in which it rests. Because long axis even of a well-flexed head in posterior position is directed toward the rear while that of the birth-canal runs forward as its lower portions are reached, the advancing pole of the presenting-part is back of center of the anatomical birth-canal and forward of the occiput. For the latter reasons, the head is relatively deflexed.

Though position of the head as described has some bearing on the clinical course of labor, its especial importance is due to the fact that it occasions the following common and significant physical sign: in posterior positions, with the head in the mid-pelvis, the cervix is further back and the anterior lower segment is more elongated than in anterior positions. This is to be interpreted as Nature's attempt at accommodation of direction of birth canal to that of the presenting-part by posterior displacement of the cervix.

However, anatomical limitations to this accommodation make it impossible for the cervix to be displaced as far posteriorly as the mid-point on the advancing vertex and account for the fact that the caput, even on heads that are absolutely flexed, is almost invariably located well forward of the occiput. Relative deflexion resulting explains subsequent difficulties in anterior rotation that many well-flexed heads meet.

At this time the cervix is usually undergoing dilatation sufficient

for the introduction of one or two fingers. However, orientation of the presenting-part is often difficult when fontanelles and sutures are depended upon as guides; for, if caput-formation is at all well advanced, structures over the cervix are made out with difficulty if at all, and the "diagnostic" anterior fontanelle is beyond reach of the examining finger if the head is well flexed and the cervix only moderately dilated. Until the occiput can actually be felt, vaginal signs are often no more than probable and should be controlled by abdominal signs referable to position of the child's body.

(4) As the presenting-part reaches the pelvic outlet, clinical importance of the posterior is greatly increased. Aside from the fact that constant, general backache is a frequent complaint, labor up to this time may have been uneventful. Though premature rupture of membranes is more frequent than in anterior position, they commonly remain intact if the presenting-part has engaged and descended well flexed.

It is near the pelvic outlet that two of the most important steps in the mechanism of labor are gone through with. They are, first, complete dilatation of the cervix and, second, anterior rotation of the occiput. That anterior rotation may occur, it is necessary that forces capable of producing it be brought to bear upon the occiput and that they exceed any forces that might interfere with such rotation. As the two approach each other, rotation is slow or incomplete. As the latter exceed the former, rotation fails completely and the posterior position persists.

The following physical conditions and forces favor anterior rotation. It is only as full dilatation is accomplished that the presenting-part can come in contact with the pelvic floor. The structure can rotate neither the lower segment nor the presenting-part while within the uterus. Therefore, until the head passes the cervix, little if any rotation is to be expected of it. These principles are of great importance; they emphasize the advisability of directing attention first to incomplete dilatation rather than to failure in rotation when the two are found associated and treatment is called for.

The well-flexed head presents the following characteristics that facilitate rotation: its advancing pole, the occiput, is at maximum distance from the anatomical center of the head and, therefore, is eccentric; its broad bi-parietal diameter is located at a low, that is, an advanced, level; and the plane presented by it is roughly spherical. A head with an eccentric, advancing pole turns (or rotates) more easily than one that possesses such a pole near its center for the same, apparent reason that a wheel is made to revolve with less effort as force is applied to its rim rather than to its hub. Further, each half of the pelvic floor directs a body meeting it downward, forward and inward. Were a body to meet both sides at the same time, direct-

ing forces would be nullified and the body would remain stationary. With the advancing pole "off the center" as is physiological, but one half of the pelvic floor is met, characteristic direction is imparted to it, and anterior rotation results. The pelvic outlet is not uniformly oval. Its size is diminished posteriorly by the inwardly-projecting ischial spines that readily interfere with rotation were it to occur at level of the outlet. But with the head well-flexed, its broad bi-parietal diameter is on a level below that of the spines and anterior rotation is normally not interfered with because of them. Again, presence of flexion is evidence of an attempt at accommodation, this time, of size of the presenting part to size of the pelvic outlet.

Finally, physiological pelvic floor and well-maintained flexion are not active forces. They produce rotation only as advance is imparted to the head by the contracting uterine muscle.

Forces and conditions that interfere with anterior rotation are due to abnormal action of uterine muscle, to deflexion, and to lack of normal pelvic-floor tone.

Abnormal action of uterine muscle is considered first because complete dilatation of the cervix is a necessary preliminary to anterior rotation. The cervix dilates when none but physiological forces are brought to bear upon it. With membranes intact and with contractions manifesting satisfactory intermittency, cervix and lower segment are drawn upward over the more or less rounded, well-flexed head. But let inertia develop as a result of increased effort necessary for moulding and descent, or let upward advance of the lower segment be retarded because of premature rupture of membranes with inevitable application of uterine walls to the irregularities of the presenting-part and tendency toward retraction of the lower segment, and progressive dilatation ceases before it is complete. Like results attend setting up of Bandl's ring in tonic contraction. Here the occiput remains in posterior position simply because it has not yet been given an opportunity to rotate anteriorly. Were inertia to develop after dilatation, rotation would not occur because of failure of the active force that directs the occiput forward.

Failure in rotation due to deflexion results from the presence of an advancing pole located toward the center of the head and, therefore, directed with less force downward and inward by the pelvic floor. If deflexion were slight, certainly if it were no more than "relative," rotation would doubtless begin; but, accompanying it, there is often increased descent as contractions persist and rotation ceases with the presenting-part deep in the pelvic cavity in the position known as "deep transverse arrest." Two other factors are to be considered in connection with deflexion. They are, first, increased size of transverse plane of the presenting-part that becomes less spherical and more elliptical as deflexion increases and, second, as-

sumption of a higher level by the broad bi-parietal diameter as the forepart of the head descends in deflexion. The larger plane meets increased resistance in rotation as might be expected. The situation is still further complicated by the fact that this broad diameter must rotate on a level approximating that of the ischial spines. Were the latter but little over-prominent, slight success would attend efforts of uterine and pelvic-floor muscles to direct the occiput forward. Many cases of persistent posterior in multiparae are explained on this basis.

Failure in rotation due to lack of tone characteristic of the normal pelvic floor is rarely met in primiparae. Relaxed floor is common in multiparae. It may be the result of unrepaired lacerations that the relaxed vaginal outlet gives evidence of. Again, it is noted where no apparent laceration has occurred but where muscles have been stretched by long-continued pressure of a large head in the lower mid-pelvis, or where multiple sub-mucous lacerations of its fibers result in permanent loss of tone it should possess. Finally, it results too often from failure to appreciate that laceration is rarely limited to the perineum but commonly extends a greater or less distance upward into one or both vaginal sulci, and from the too-frequent practice of applying sutures to outward laceration only, leaving the inside unrepaired and, therefore, permanently relaxed.

Regardless of extent to which the pelvic floor is relaxed, some degree of anterior rotation can be expected of it, although the clinical course of labor is often influenced by it in one of the following ways: First, as a result of its ability to impart some forward motion to the presenting-part, the occiput begins anterior rotation; but the process is complicated by a varying degree of deflexion that results in production of an advancing plane of larger diameters, and anterior rotation soon ceases because of pelvic-floor, causeular insufficiency together with increased bony resistance encountered. The presenting-part rests in the transverse diameter of the outlet and, because of relaxation, at a level that is deep. If sufficiently low, the caput appears at the outlet. In fact, in posterior positions, appearance of the caput and subsequent failure of the presenting-part to advance in the presence of efficient, propulsive contractions is presumptive evidence of "deep transverse arrest." Since stretched and relaxed muscles explain incomplete rotation and make possible deep position of the presenting-part, failure of the relaxed pelvic floor as a rotating force must be an important factor in production of "deep transverse arrest."

Second, association of relaxation and deflexion results frequently in complete failure in anterior rotation, and position of the occiput, directed posteriorly and to the right or the left, "persists." If expulsive efforts continue, the presenting-part advances a sufficient dis-

tance for the perineum to be distended. When the perineum bulges posteriorly, evidence is positive that the head is advancing with the occiput directed posteriorly.

Third, when anterior rotation is impossible because of condition of the pelvic floor described, nature frequently brings about spontaneous delivery by substituting for anterior rotation a movement that accomplishes the same purpose, namely, accommodation of antero-posterior diameter of head to the same diameter of the pelvic outlet. The occiput rotates posteriorly the short distance necessary for it to lie in the hollow of the sacrum, and the position becomes "occipito-sacral."

Slight disadvantage that arises from the fact that larger rather than smaller diameters pass the outlet as the head is delivered occiput-directly-to-the-rear is more than compensated for by the fact that both mother and child are spared the possible dangers of obstructed labor, due to deep transverse arrest or persistent posterior that might continue unrecognized, when delivery is accomplished in this manner. Further, the question of increased soft-part resistance is of relatively slight importance because the occipito-sacral mechanism is almost invariably met in multiparae where the outlet is more or less large or in primiparae where the child is relatively or absolutely small.

Physical signs of the posterior at the pelvic outlet are easily elicited because the cervix presents relatively advanced dilatation. The caput lies in the cervix. While its size is roughly determined by cervical dilatation, its thickness is an unfailing measure of efficiency of uterine contractile efforts. Efficiency rather than strength is emphasized; because, in the presence of retraction or tonic contraction ring, the lower segment is drawn upward over the presenting-part with increasing difficulty, the cervix fails to dilate progressively, and the caput ceases to increase in thickness. Grasp of the retracted lower segment makes contractions inefficient as dilating forces regardless of their strength.

Location of the caput is an unfailing guide as to the amount of deflexion present. When the head is well flexed, it is located at the anterior border of the occipital bone. Its position is forward of the occiput as deflexion obtains. Palpation of diagnostic fontanelles and sutures is often difficult when a large caput overlies them; and the occiput can be located with accuracy only as the examining fingers are carried far enough in to palpate it or to feel the anterior fontanelle. In doubtful cases, exploration of the lower segment in an effort to locate the posterior ear is justified. At such time, region of the contraction ring can be examined for evidence of tone that may offer ready explanation of failure in dilatation and anterior rotation.

As the head is born, the occiput is seen to turn back through an arc

of 135° when the primary position was posterior and the shoulders were engaged when anterior rotation occurred. When the head restitutes through an arc of but 45° , the only constant signs of early posterior position are those referable to the caput.

As a result of its examination, three points of clinical importance can be established: First, presence of the caput forward of the occiput is evidence of deflexion characteristic of all posteriors and can be taken as the measure of it in the individual case. Second, its location at one side or the other of the sagittal suture shows primary location of the occiput to have been toward the opposite side. Third, thickness or depth of caput can be accepted as positive proof of the amount of muscular efficiency actually expended in driving the presenting-part onward.

Treatment of the occiput posterior resolves itself into an appreciation of defects in physiological mechanism that result in failure in rotation and advance and the carrying out of procedures that correct or compensate for these defects. What you do depends upon what Nature has not done or is doing improperly, and is guided by well-defined principles. It follows that there can be no arbitrary method of treating the posterior.

Further, treatment is both preventive and active. It consists of prophylactic management of pathological conditions that make progressive advance difficult or impossible, and of active treatment of the manifestations of unsuccessful rotation and retarded advance. If this attitude toward the posterior is acquired, it will be unnecessary to learn what to do; on the contrary, procedures suggest themselves.

With the presenting-part unengaged, treatment is prophylactic. When the child's back is found in the maternal right flank and the right-lateral is the posture commonly assumed while at rest, the patient may well be directed to lie on the left side, when the child's body will be directed toward the front. This favors engagement with the occiput in anterior position; and it could well be supplemented by having her wear properly adjusted pads inside her corset to hold the back forward as the patient assumes the upright posture. Position changes so often before engagement and the prognosis for successful anterior rotation in the posterior is so good that these procedures have possibly more theoretical than practical value. However, in the presence of prominent ischial spines, relaxed pelvic outlet, or of uterine muscle of which diminished action is to be expected, their practical value increases.

If engagement fails to occur, it is because of actual or relative pelvic contraction or primary uterine inertia; and treatment indicated is that the type of abnormality calls for. It is immaterial whether or not position is a probable posterior.

With the presenting part well engaged, active treatment is rarely

called for. In a primipara the head is usually engaged in an oblique diameter and satisfactory flexion can be expected. In a multipara engagement in the transverse is usual and the position becomes an actual posterior only as the occiput rotates toward the rear as anatomical relations between head and back, located in the flank, are restored. At this point the possibility of converting a probable posterior into an anterior by placing the patient on the opposite side to that toward which the occiput is directed should be borne in mind. Such treatment will result in enough anterior displacement of the back to assure descent with the occiput toward the front in a sufficiently large number of cases to warrant its general employment. All that is required is that the probable position, based upon knowledge of location of the child's back, be known and that the patient be in bed. Conservation of general muscular strength that results and opportunities offered for frequent palpation of contractions are sufficient reasons for keeping her there.

A "defect in physiological mechanism" occurring at the inlet is premature rupture of membranes. Its clinical significance depends almost entirely upon dilatation present when the accident happens. If the internal os is quite completely obliterated, the course of labor is more often expedited than retarded. On the other hand, when internal os is discrete and lower segment thick, dilatation proceeds slowly. Should lower segment retraction develop, not only upward advance of the lower uterus over the presenting-part but also downward progress of the latter through it, would be retarded. If retraction were sufficiently prominent, labor would become obstructed.

In the latter condition danger is increased when the position is posterior and deflexion exists because increased size of the presenting-part offers still greater resistance to progressive dilatation and lower-segment thinning-out. Treatment, when decided upon, should be directed toward relief of retraction and accomplishing dilatation rather than toward securing anterior position for the presenting-part.

With the head engaged, the occiput can be brought forward only as the head is raised above the inlet. If disengaged from the transverse diameter, re-engagement in the same diameter can be expected. If raised out of an oblique, the manipulation necessary to bring the occiput anteriorly invites the danger of prolapse of cord and, for this reason, is of questionable value. Provided the fact that the cervix dilates less readily over a deflexed head is borne in mind, position of the occiput can be disregarded in treating the conditions mentioned. Here, conservative manual dilatation under an anesthetic and introduction of a hydrostatic dilator are operative procedures that promise desired results.

Dry labor and retraction have been considered at some length not for the purpose of advocating use of an artificial dilator in every case

where membranes rupture early and the head is retarded at the inlet. Many require no treatment; and the presenting-part would be found in the mid-pelvis by the time such a procedure could be carried out. In others, a single dose of morphine combined with atropine produces sufficient muscular relaxation for retraction to be recovered from and for the head to advance. On the other hand, purpose of the discussion has been to establish a conviction that, when delay at the inlet and dry labor are met and when the position is posterior, the difficulty is due primarily to failure in dilatation rather than to location of the occiput. Appropriate treatment will then be applied.

When the head is arrested at the pelvic inlet, or even in the high mid-pelvis provided the lower segment is incompletely thinned-out, the writer considers delivery by internal podalic version and breech extraction a positive indication in all cases where vaginal delivery is permissible. Forceps even in most competent hands give promise of no such freedom from fetal and maternal traumatisms as do skillfully performed version and extraction after the full possibilities of moulding have been realized. The fact that the occiput is posterior tends to make demand for the procedures greater. For reasons that are apparent, manual or instrumental rotation of high heads is impossible.

With the presenting part in the mid-pelvis, prophylactic measures are still of value. Postural treatment may be applied if the shoulders are unengaged. Active treatment is rarely called for. It is at the pelvic outlet that incomplete dilatation and failure in rotation are met. On occasion, however, advance of a well-flexed head is retarded. The difficulty is due to disproportion and to it treatment should be directed. If associated with dilatation as is common, manual or hydrostatic aid is indicated. Here, manual rotation is difficult because of disproportion; and it is unnecessary because full dilatation may be presumed to be followed by spontaneous anterior rotation.

Rupture of membranes at this point predisposes to incomplete dilatation and retraction. Onset of the latter is guarded against as the patient is kept in bed and fluid accordingly permitted to escape slowly. With the appearance of retraction sufficient to obstruct labor, deep ether anesthesia and as complete cervical and lower segment dilatation as is possible are indicated.

As the presenting-part transverses the pelvic cavity, moulding and size of caput are increasing. They are important: they will be found to explain the unsuccessful attempts at "increasing flexion" at the pelvic outlet.

With the head at the pelvic outlet postural treatment serves no purpose. Shoulders have invariably engaged and the occiput remains posterior while the back cannot be brought forward because the shoulders are fixed. Treatment of lack of advance is active, that is

it is mechanical; and the procedures available are determined by the causes of delay. They are incomplete dilatation, ineffectual contractions, insufficiency of pelvic floor, and presence of deflexion. It is rare for a single one to be responsible for delay. The latter results more often from combinations of them and treatment is based upon their analysis.

Until the cervix is fully dilated and spontaneous rotation has failed there is no point in effecting manual rotation of the occiput. Causes of failure in dilatation should be attacked. If due to moderate disproportion, there is usually associated a degree of retraction sufficient to contraindicate the use of pituitary extract in an attempt to make the muscle complete the dilatation spontaneously. The condition is common in primiparae. When contractions are frequent, prolonged and propulsive and complete dilatation has yet to occur, complete relaxation of the lower uterus by means of ether is followed by careful manual dilatation and pushing of the relaxed lower segment up over the presenting-part that may have been fixed in its position by application of forceps. Under similar conditions, in multiparae, when a thin rim of unobliterated internal os retards complete dilatation, manual dilatation removes the one barrier to spontaneous anterior rotation and advance. In the presence of retraction sufficient to have increased the thickness of cervix and lower segment and to have made them edematous, a hydrostatic dilator accomplishes more satisfactory though less quick results than the hand. Use of ether not only relaxes tone the incompletely dilated cervix may present but also makes it possible for the examining hand to be carried well up along-side of the presenting-part and region of the contraction ring palpated for evidence of tone. If failure in dilatation is due to firm grasp of the tonically contracted ring—and such is not infrequently the case—the latter becomes the primary cause of delay and must be removed by deep, surgical, ether anesthesia.

When uterine inertia explains the delay, treatment depends upon cause of muscular inaction. If secondary to a distended bladder or rectum, initial treatment is obvious. If the result of actual or approaching exhaustion, the temptation to stimulate with pituitary extract must be resisted; for any temporary response would be followed by more profound postpartum inertia as a result of which bleeding, due to atony, would be inevitable. Here, failing uterine force should be anticipated: it should be supplemented by artificial dilatation followed by conservative forceps delivery accomplished in the presence of the gradually-failing contractions.

Finally, complete dilatation is often possible only as membranes are ruptured artificially. Pressure within the sac in front of a tight-fitting head may be too low to result in spontaneous rupture. When the fluid is made to escape, contractions increase in strength, firm

resistance of the head meets thin rim of undilated cervix, and complete dilatation of the latter speedily follows.

Regardless of complete dilatation, rotation fails when contractions are ineffectual. They may be so characterized when they fail to produce results. This does not mean that uterine-muscle efforts have necessarily ceased. There may be coming and frequent intervals and subjective "pain" may even be increased, but they are not accomplishing results in the particular case. They are relatively inefficient either because size of passenger calls for more strength of muscle to make it advance or because contractions are not transmitted to the cervix in such a way that it dilates. The former is met in cases of relative pelvic contraction; the latter in those of retraction and tonic contraction ring.

The clinical course of relative inertia is constant: muscular efforts get progressively weaker. That actual inertia may not develop during labor, and particularly at its termination, it is imperative that relative inertia be treated.

Two methods suggest themselves. First, stimulate the uterine muscle and make it work harder. For this purpose it is presumed a conservative dose of pituitary extract, 3 or 4 minims, would be administered. If disproportion were marked, immediate effect would be disappointing; for little increased efficiency can be expected of muscle that has already shown itself unequal to the task before it. The remote effect would be dangerous; for the scant supply of reserve muscle energy possessed by the uterus would be exhausted and a more pronounced inertia, with its untoward possibilities, would follow termination of labor. Even if disproportion were slight and spontaneous delivery were to follow active stimulation, the third stage and the postpartum hour would be entered upon with the uterine muscle still further depleted of its energy. On the other hand, were the failure of contractions to produce results due to retraction, no argument is needed to establish the fact that the situation produced is far more grave than that for which treatment was applied. Experience proves that a moderately prominent contraction ring may acquire a rigidity following pituitary stimulation that the most profound anesthesia cannot relax sufficiently for a live child to be delivered through it. Uterine stimulation, particularly that produced by pituitary extract, has an important place in obstetric therapeutics. However, its field is not treatment of lack of advance due either to failing musculature or to retraction.

Second, conserve inadequate or ineffectual muscular energy by helping the uterus to do its work. Dilate the cervix in a manner earlier described and facilitate subsequent anterior rotation and advance by supplementing each expulsive effort. If application of forceps is decided upon, exert traction when, and only for as long as,

the uterus contracts. This procedure conserves uterine muscle energy and, at the same time, lessens the amount of forceps pressure and traction to which the presenting-part is subjected.

There is one group of cases to which this conservative type of advance is not suited. When retraction has gone unnoticed, the musculature acquires a tone that can be relieved sufficiently by anesthesia for the child to be advanced through it but that sets itself up again so readily when the stimulating effects of the instrument and beginning traction are brought to bear upon it that delivery must be accomplished in the absence of uterine contractions. Increased force necessary to produce advance under these conditions, however, is much less than would be required were all-possible tone not removed by the use of ether.

With inertia treated along the lines suggested, the third stage and the puerperium are entered upon with the uterine muscle possessing enough contractile energy to preserve the tone that decreases the danger of hemorrhage and that favors satisfactory involution.

In treating delay in advance due to insufficiency of pelvic floor and deflexion, two procedures suggest themselves: first, correction of them and, second, substitution of adequate forces for those that are deficient or wholly inert.

Correction promises little. It is apparent that nothing can be done at this time to restore physiological tone to a relaxed or lacerated pelvic floor. Little more can be accomplished when attempt is made to favor anterior rotation by increasing flexion of the head. In an interval between contractions, the brow can be retarded (or raised) in a satisfactory attempt at increasing flexion; but any momentary advantage is lost as soon as contraction is set up. Then the head advances and reassumes its original position in relation with the cervix; because, as a result of moulding and caput-formation that have been going on since dilatation began, the presenting-part has accommodated itself to general shape of the lower uterus and assumption of the new position of flexion is improbable. This is especially true of cases that need correction most.

Little argument is necessary to dissuade the operator from attempts to secure satisfactory anterior rotation under these conditions by stimulating the uterus to increased activity. If condition of pelvic floor and deflexion make rotation in the presence of normal uterine action impossible, it is unreasonable to suppose rotation would be produced were strength of contractions to be increased. In the presence of heightened uterine action, the head may descend deeper but position of the occiput remains unchanged.

More direct, much more efficient and, therefore, more satisfactory treatment consists in producing anterior rotation artificially. The occiput is brought toward the front. From this point, advance is un-

eventful unless the situation is complicated by inefficiency of contractions, when artificial advance may well be considered as a conservative measure.

Manual rotation is difficult and often impossible if the head is large. Even if relatively small, resumption of the posterior position invariably follows the procedure unless both back and shoulders have been made to rotate anteriorly at the same time. With the head at the outlet, this is possible only as the shoulders and upper trunk are raised out of the pelvic cavity and forcibly rotated. The procedure is not always easy even though the uterus is relaxed sufficiently to permit it. Invariably the possibility of prolapse of cord is invited. Insistence that immediate delivery by version and extraction is possible should the cord advance hardly justifies assumption of the risks involved. Further, space sufficient to permit of the necessary introduction of the hand alongside of the presenting part would invariably allow of easy introduction of forceps and of as simple an instrumental rotation of the occiput. Forceps not only keep the occiput in anterior position; but they also make subsequent advance possible were the latter indicated.

A procedure that is both simple and effectual in suitable cases may well be described. Not infrequently in primiparae where the head is well flexed, delay in rotation due to slight relative disproportion at the pelvic outlet is met. One or the other ischial spine commonly interferes with rotation. Here a finger in the rectum can be made to "hook" the occiput forward. Flexion makes the procedure possible and is still further increased as a result of it. For the latter reason, speedy anterior rotation often results. When deflexion exists, the procedure is ineffectual; the occiput is too far behind and too high for the curved finger to get behind it.

When the cervix is fully dilated and posterior position persists, lack of advance is best treated by instrumental rotation followed, when indicated, by advance and delivery. Rotation and advance are two separate procedures and traction on the head should not be exerted until the occiput has been rotated well anteriorly. When exerted while the occiput is posterior, deflexion can with difficulty be corrected—it may even be increased—because pull of the forceps is from the front. On the other hand, increased flexion as anterior advance progresses is desired in order that resistance may be diminished.

Preliminary to forceps application exact location of the occiput must be known. The too-frequent delivery of posteriors with face to the front is evidence that this precaution is often not taken, for it is inconceivable that the operator would elect to deliver the case occiput-to-the-rear. An application, as indifferent as has been his attitude toward locating the occiput, is secured; firm traction is ap-

plied; the occiput rotates the shorter distance, posteriorly, into hollow of the sacrum; and the head is subsequently delivered in the manner described. The occiput has been rotated artificially to the rear. This should not be confused with the spontaneous occipito-sacral mechanism not infrequent in multiparae but encountered in full-term primiparae with the rarest of exceptions. This method of instrumental delivery is undesirable because of the danger of extensive perineal injury that is involved. For this reason, it will not be considered an elective method of delivery. Its utility is extremely limited even as an emergency procedure.

The double application of forceps is a familiar method of producing advance. Although the initial application is cephalic it is "inverted," and tractile force will inevitably be transmitted to middle and anterior part of the head, either preserving or actually producing deflexion, when advance is brought about before rotation has been accomplished. On the other hand, preliminary rotation in the mid-pelvis with two blades applied may be difficult because of bony resistance encountered.

Bearing in mind that as complete anterior rotation as is possible should be secured before advance is brought about, rotation is easily accomplished and flexion not only preserved but even produced in some cases of deflexion when the persistent occiput-posterior is treated in the following manner.

Position of the occiput is determined with accuracy. If to the right, the same (right) blade is inserted posteriorly and directed inward until its cephalic curve is applied to the side of the child's head. That the tip may rest approximately in the mid-line of the pelvis, the handle must be kept slightly to the operator's left. The handle is now grasped and the occiput "lifted" toward the front as the handle is both turned upon itself to the right and brought into the mid-line. This procedure may be facilitated by inserting the left hand into the vagina to aid in rotation of the occiput and, if necessary, to hold it in anterior position until the left blade can be applied.

If the first step has been successful, the occiput is directed at least to the maternal right and often forward of it and the brow to the left and often backward. Prominence of the brow toward the rear must be borne in mind when the left (or opposite) blade is placed in position.

The left blade is inserted posteriorly until its cephalic curve fits the head. Then it is swept to the operator's right upward over the face and finally brought to rest on the left side of the head. Configuration of the pelvic cavity and shape of the head make it necessary for the blade to change its direction frequently; and this is made possible by corresponding movements of the handle. With the cephalic curve of the blade, inserted posteriorly, in contact with

the right side of the head, the handle is directed slightly to the operator's right in order that tip of the blade may lie approximately in the mid-line. The handle is grasped and both raised and turned slightly to the left upon itself as the blade begins advance over the face; but, before the prominence of the brow is reached, the handle is directed to the operator's extreme left in order that the forehead may be passed rather than re-directed toward the front. The latter invariably results and the posterior position is resumed unless extreme care is exercised at this point. Turning the handle to the left upon itself is persisted in and the blade sweeps over the face. As the left side of the head is approached, the handle is directed sharply downward and toward the center as the blade is made to advance, under the pubic arch, until it rests on the left side of the head. The handles are now examined. Though they occupy the same plane (application being cephalic), they will not lock because the left, the blade that must be the lower, is actually the upper. The difficulty is speedily remedied by sweeping one over the other until the left rests under the right, when they lock readily. Application is now a true cephalic and the head lies at least in the transverse diameter. If for no other reason than because tips of the forceps are directed toward the occiput, anterior rotation is easily accomplished by simple rotation of the instrument. If rotation is retarded, traction may be employed with the knowledge that flexion is being produced because pull is being exerted from the region of the occiput.

The procedure is obviously applicable to medium and low rather than to high positions of the presenting-part. Provided the precautions to advance the handle of the second blade well to the operator's left (in R.O.P. positions) as the brow is passed and to depress it sharply as shank of the instrument passes beneath the pubic arch are observed, this procedure promises most satisfactory results. If they are not carefully observed, the second blade actually re-directs the brow forward and the application is found to be an "inverted cephalic." In the L.O.P. position the procedure is the same, although left is substituted for right and the latter for the former when indicated. Since the left (or lower) blade is introduced first, the forceps will lock as soon as the second (or right) is placed in position.

Various steps of the operation are more easily carried out as the solid—rather than the fenestrated-blade—instrument is used.

In the rare instances in which the presenting-part elects to leave the birth-canal with the occiput directed to the rear, and in the still more infrequent instances in which the emergency demands that it be so delivered instrumentally, the probability of perineal laceration must be borne in mind. Danger of laceration is diminished as a method of delivery of the head that most closely simulates the physiological is practiced. That the broad head may escape by a diam-

eter at least approximating the sub-occipito-bregmatic, the brow is retarded if possible until the entire occiput region has passed over the perineum that should be supported by firm, general, upward pressure. Extension may now be permitted and the brow allowed to advance beneath the symphysis. In the presence of rigidity of the parts or of a long, thin perineal body, the danger of laceration is removed when episiotomy is done after the parts have been subjected to reasonable stretching and before actual laceration has occurred.

Treatment of the occiput posterior may be summarized as follows. Until the shoulders have become engaged, treatment that displaces the child's body toward the front and holds it there favors assumption of an anterior position by the occiput, provided the presenting-part is so located that the occiput can rotate. The latter may lie above or below but not in the inlet. After engagement of the shoulders, neither forward displacement of the body nor even manual rotation of the occiput gives hope of permanent assumption of an anterior position by the latter; for, when the rotating force is removed, the occiput re-assumes its anatomical relation to the shoulders. When labor is obstructed at the inlet or in the upper mid-pelvis and the occiput is posterior, the conditions to be treated are those that have caused obstruction, such as retraction and pelvic deformity, and not posterior position of the occiput. In other words, there is no treatment for the occiput posterior as such when labor is obstructed high up. When the presenting part rests in the low mid-pelvis or at the pelvic outlet and when anterior rotation and subsequent advance do not occur, treatment depends upon analysis of cause or causes of delay in the management of which the most important item is artificial aid in doing what nature is unable to do, in doing it in the way that most closely simulates nature, and in doing it before untoward results of delay demand it. The judicious use of forceps meets each of these requirements.

Attitude toward the occiput posterior should be one of active expectancy. As a result of it defects in mechanism are anticipated and, for this reason, treated more satisfactorily should they develop. Active expectancy applies treatment that is indicated; but it is not meddling. It is the opposite of a policy of mere "let alone" that results in treatment only when fully-developed abnormalities demand it. At such time it may be more difficult and less satisfactory.

THE RESULTS OF FOLLOW-UP WORK WITH INFANTS IN A MATERNITY HOSPITAL*

BY WALTER LESTER CARR, M.D., AND BRET RATNER, M.D.,
NEW YORK, N. Y.

(*From the Manhattan Maternity and Dispensary, New York.*)

MUCH thought is being focused upon the many problems of child welfare, and in every field of pediatrics, whether it be among the newborn, nutritional, orthopedic, tuberculous, cardiac, or psychiatric, the desideratum is preventive medicine. It is this movement which has brought about such a marked reduction in infant mortality and morbidity, by the organization of clinics where these problems are studied.

There is, however, and always will be a concentration on the "present illness" of an infant, while other conditions observed by the physician will be deferred until that for which the patient is brought to the clinic is cleared. Unfortunately, as soon as the acute illness is taken care of the infant is not ordinarily brought back for further observation; and even were the patient to return to the already overcrowded clinics—which must primarily serve the sick—there would be little time or space to devote to an apparently healthy baby with a minor defect. This obtains particularly with the newborn. A mother leaves a maternity hospital after confinement with inadequate advice as to the care and management of her child. When difficulties arise she is guided by information from neighbors and friends, without benefit to her baby, and with a consequent loss of time in case of illness. We believe the only way to correct this situation is to establish postnatal clinics in all obstetrical hospitals where pediatricians will educate the mothers and take full charge of the infants.

The observations recorded in this paper are the results of one year's study (1921-1922) of 410 babies born at the Manhattan Maternity, where—with the sanction of the surgical staff of the hospital—we established such a clinic.

Over 90 per cent of the mothers were primiparae of the better working class. Being young, and having no knowledge of the care of children, they showed an unusual willingness to cooperate with us and follow our advice.

Routine of the Clinic.—The history of the confinement, the birth weight and the Wassermann reaction were noted on every chart. In

*Read at the Thirty-fifth Annual Meeting of the American Pediatric Society at French Lick, Indiana, May 31—June 2, 1923.

addition to the hospital examination the infant received a complete examination, was weighed, and accurate measurements of the head, thorax and abdomen were made, and also the length and the size of fontanels recorded.

Two nurses were in attendance on every patient—one to assist with the undressing and examination, and the other to take weights, temperature and measurements. Our findings were recorded by a volunteer worker. Two social service workers carried out the follow-up work, visiting homes to help mothers carry out instructions whenever necessary. The babies returned once a week until the sixth week, then once every two weeks, and then once a month. However, some infants were seen as often as three times a week, if we felt it necessary.

We followed feeding and minor physical conditions. Interesting anomalies were also kept under our observation whenever possible. Acutely sick infants, or those requiring special treatment—such as eye cases or orthopedic cases—were transferred to special hospitals with which we kept in touch; after which the child returned to our clinic for advice on general hygiene and feeding. Many patients were followed throughout the first year.

General Hygiene.—At every visit many points of hygiene were stressed and we found that only by repetition could the best results be obtained. For example, one factor of great importance was the question of too much handling and rocking. It was by repeatedly stressing the point, together with the change from a crying and so-called colicky baby into a peaceful, contented infant when our directions were carried out, that made the mothers realize very soon how much easier it was for them if they were guided by us.

The questions of regularity of nursing, sleep, quiet, frequent bathing, leaving the mouth alone, shielding the eyes from strong lights, clothing, diapers, fresh air, were all gone into carefully and repeatedly.

Breast Feeding.—We had an excellent opportunity to encourage breast feeding inasmuch as these young mothers showed the same willingness to continue breast feeding as they did to follow out the measures of general hygiene. The fact that we were to follow the infant regularly, so that questions that arose could be referred to us, obviated a great deal of the nervousness of the mother which usually ensues at this period because of poor advice and excessive worry about the child's welfare.

A three-hour nursing schedule was advised in almost all normal cases, followed by a four-hour schedule at three months, and at this time a supplementary feeding was usually given.

The physiologic facts about breast secretion and feeding were ex-

plained to the mother, and the question of her diet and hygiene were emphasized. The following were the points stressed:

1. Worry is detrimental.
2. The child should be nursed from one breast at a time, because the more completely a breast is emptied the better it will secrete.
3. The latter part of the breast feeding is richer in fat than the early part.
4. The child gets most of its food in the first five minutes.
5. The child should be raised vertically after nursing to expel air swallowed, and then placed on its right side on an inclined plane.
6. Absolute regularity insures the proper filling of the breasts, and a proper appetite in the child.
7. Only plain boiled water is to be given, not sooner than two hours after feedings.
8. Mothers should eat well rounded meals, but at no time should they indulge excessively in any particular foods. It is not necessary to eliminate foods (such as tomatoes, oranges, etc.) except those that disagree.
9. Constipation in the mother should be corrected by diet and proper hygienic measures.

The Relation of Certain Abnormal Conditions of the Breast to Nursing.—Many infants are hurriedly taken off the breast because of some condition that might easily be corrected, such as sore or cracked nipples. It should be remembered that unless this apparently simple trouble is treated immediately and properly, there is the danger of the development of a breast abscess which may endanger the health and perhaps the life of the mother. These abnormal conditions were treated by local applications of compound tincture of benzoin, by instructing the mother to keep her nipples thoroughly dry between nursings, and in insistence upon nursing the infant from one breast at a time. In those cases where the cracks were so marked that pain and bleeding ensued and made nursing almost unbearable, the child was put on supplementary feedings, and then taken off entirely from the breast for several days, allowing the breasts to heal completely; after which breast feedings were easily reestablished. In the less severe cases it was only necessary to rest the breasts during the period of alternate supplementary feedings. No nipple shields were advised. In no instance, in our entire series, was it necessary to wean any child on account of sore nipples, nor yet did we have any cases of breast abscess.

With the cases of inverted nipples, or very small nipples, the mothers were taught to express as much breast milk as they could for each feeding, and complementary formulae were added. These babies

were fed as long as possible in this way, and then were completely weaned.

There were a fairly large number of breasts that did not secrete well for several weeks after the child was born. Complementary feedings were discouraged, however, and the mothers were advised that the child would not gain well for a while but that it was absolutely essential that it remain hungry in order to force a complete emptying of the breast at every feeding, and thus stimulate secretion. (Only in a few instances was it necessary to give complementary feedings.) The breasts under this regimen—with adequate diet for the mother—became sufficient for the child's needs.

Menstruation During Lactation.—After observing this large group of mothers and babies we were able to conclude that menstruation has very little effect upon the process of lactation. In the majority of cases absolutely no ill effect was noted. In a fair number, the infant was hungry and showed an inadequate gain during the week of menstruation. These observations agree with the majority of workers, and indicate definitely that no child should be weaned on account of menstruation.

Eczema and Urticaria from the Standpoint of Protein Sensitization.—We cannot here go into a complete discussion of this important phase of pediatric practice, except from the one standpoint that we are endeavoring to emphasize in this paper, namely the prophylaxis and treatment of newborn conditions in their incipency. There were ten babies with eczema in our entire series of 410, seven of whom gave negative skin reactions to the various foods tested. A correction of the mother's diet and simple therapeutic measures cleared the condition, without recurrence. Two of the remaining cases reacted to egg albumen, and one to cow's milk. These three cases cleared up promptly when the excessive egg and milk intake of the mothers was curtailed; the children were subsequently desensitized by minute doses of the offending protein injected subcutaneously, and were entirely tolerant to the offending foods before it was necessary to give them these foods. If it were possible, therefore, to discover and properly treat this type of case long before the particular food the child is sensitive to is to be given, many of our infantile eczema, and subsequent asthma, cases would be eradicated.

Thrush.—The etiologic factor in the causation of thrush is well known, and the predisposing factors are variously attributed to malnutrition, diarrhea, lack of cleanliness, and the habit of cleansing the mouth of the newborn. It was rather surprising, therefore, that in this large group of well nourished and well cared for breast fed infants, we should have found a number of cases of thrush. We could not

trace this condition to any of the above factors, except in a small minority of the patients. Knowing that the *saccharomyces albicans* thrives only in an acid medium, sweetened water seemed to be the logical predisposing factor. In endeavoring to elicit information with reference to the use of sweetened water, we asked, "How much sweetened water does the baby take?" To this query we received positive information of its use in all the patients with this disease. The importance of not giving sweetened water was again emphasized to these mothers. At this point we may call attention to the importance of actually following these infants: here were mothers who had been definitely instructed not to give sugar water, and yet they did so. For treatment a nurse instructed the mothers to paint the lesions once a day with 1 per cent formalin, or 1 per cent silver nitrate, and to gently wash the mouth with a solution of soda bicarbonate every two hours. Uniformly good results were obtained.

It may be highly probable that the diarrhea given as a predisposing factor in thrush may also be due to an excessive sugar intake.

The pediatrician has the valuable opportunity when such diseases arise of emphasizing the dangers of the use of sweets between meals; first, in the causation of thrush and diarrhea, second in the perversion of the normal sense of taste, and lastly as a factor in the production of carious teeth.

Umbilical Hernia.—In the 410 cases cared for, routine examination for umbilical hernia was made, and 63 per cent presented a normal umbilicus. Twenty-eight per cent of the infants presented slight umbilical hernias, or really what might be regarded as umbilical protrusions. These cases were strapped merely as a routine measure, as it is well known that these slight umbilical openings close spontaneously. Nine per cent, however, presented definite pathologic hernias which were treated energetically by reinforced adhesive strappings; these were carefully followed, being restrapped when the adhesive plaster loosened. The time for a complete closure of the hernia varied from two weeks to several months. We gather from our series, therefore, that the healing of a definite umbilical hernia with proper technique—as described in pediatric textbooks—takes a fairly long time, but the important point is that the hernia can be healed if it is followed intensively. The pediatrician never sees the end results of this sort of hernia, if it is permitted to go untreated, but it should be remembered that these umbilical hernias lead to a great deal of discomfort and ill health very often in later life—particularly in women. The responsibility rests almost entirely with the pediatrician to correct the defect at a time when it is most amenable to a simple process of treatment.

Umbilical Granulomata and Polypi.—Of our entire series of cases only three granulomata were seen and seven polypi (which speaks very well for the obstetrical service). These conditions, which are seen rather frequently in a general dispensary practice, are the result of poor management of the cord: the viscid discharge and the protruding polyp prevent the proper healing of the cord, and very often produce excoriation around the umbilicus. When an umbilical hernia is also present, healing of the hernia cannot be accomplished, unless the former condition is eradicated and the diagnosis of the condition is not always made unless one draws the skin around the umbilicus wide apart. The application of silver nitrate for the healing of the granulomata is sufficient. The polypi are best treated by tying off the pedicle with sterile silk suture. These polypi should never be cut, as serious hemorrhage may ensue. The polypi usually fall off twenty-four hours after being tied off.

Inguinal Hernia.—This was rare in our series, as only one case was observed. The hernia was treated by a truss made with a skein of worsted, which was changed frequently. The hernia was healed after seven weeks of such treatment. It was observed for six months, without any recurrence. This child was prevented, therefore, from future operation by this simple method which was, however, followed up intensively.

Rickets.—All the prematures, Italian and colored infants were treated as potential rachitises, and from the third month were given cod-liver oil, and sun exposures were advised. Head-sweating, rachitic beading and any other suggestive sign of rickets were carefully looked for; if found, these cases were treated as true rachitises. As a result we had no frank case of rickets develop in our series.

ANOMALIES AND CONDITIONS OF PATHOLOGIC INTEREST

In a clinic of the character mentioned here, we are interested primarily in feeding, hygiene and the correction of minor conditions. However, cases of pathologic interest are here seen at their very beginning, and observations can be made which are of practical interest. The following is a summary of the more interesting cases observed in this series.

Aniridia Followed by Glaucoma.—In this case the infant was born with a complete closure of the left pupil; the entire eye was smaller than the right. After the fourth month the eye progressively developed into a marked glaucoma. This did not interfere with the child's physical development otherwise. The child was referred to an eye clinic, where subsequent operation was performed.

Arrested Hydrocephalus.—From the second to the twelfth week this infant's head enlarged rapidly, the frontooccipital circumference in-

creasing from 40 cm. to 46 cm. (the average increase in circumference for the entire first year is only 10 cm.) The sutures remained wide apart, the anterior fontanel measuring 7 x 7 cm. At the thirteenth week the head stopped enlarging, and in the following five weeks only increased 1 cm. The sutures which were open for five months gradually began to fill in, and normal progression of the head development ensued. This child was observed for one year, and we regard the case as one of arrested hydrocephalus. Cod-liver oil was given from the third month.

Albinism.—One typical case was observed.

Superficial Facial Palsies.—These were observed in forceps cases. The average time for recovery was from 35 to 46 days. The only treatment prescribed was warm applications.

Cephalhematoma.—All the cases cleared entirely, with the exception of one in which the blood clot became calcified, and left a permanent calcified tumor about the size of an almond.

Mongolian Idiocy.—This infant was born of a para xiv, forty years of age. It was seen at twelve days of age, and died the following week. The case was typical, and suggests the exhaustion theory in this particular instance.

Mongolian Spots.—These interesting olive green pigmentations usually present in the sacral region were observed in the following races—Japanese, Porto Rican, Italian, Negro and Spanish. They do not always connote, therefore, negroid or Mongolian blood.

Congenital Amputation of Extremities.—An amputation of the left forearm and left foot was noted in one case. The mother was a para iv, and gave the suggestive information that her husband had beaten her and kicked her in the abdomen during pregnancy.

Pylorospasm and Pyloric Stenosis.—Three cases were observed. One case developed into a true pyloric stenosis. The parents refused hospital care. Atropine treatment was prescribed, but on account of the poor cooperation which was given, it is impossible to say whether the atropine was used, and how our orders were carried out. The infant died.

The second case did poorly on the atropine treatment at home, and the child was sent to the hospital. The diagnosis of pyloric stenosis was concurred in by the attending physicians, and when medical treatment was found ineffectual the child was finally operated upon. However, the child died shortly after the operation. At autopsy no tumor or other condition was found which would account for the projectile vomiting.

Medical treatment was also used in the third case, in which we had excellent cooperation in the home. Atropine was given until we gradually reached the maximum of $\frac{6}{1000}$ of a gr. six times a day. The

atropine was discontinued for one to two days at varying intervals, during the course of the treatment to note the progress of the case. The baby was one month old when the pylorospasm developed, and treatment was continued for a period of four months.

If one believes that all cases of pyloric stenosis are antedated by pylorospasm, then it is evident that the best results will be obtained when cases are seen early, as can be done in a clinic of this type.

Tuberculides with Pulmonary Tuberculosis.—At seven weeks this infant, who was thriving excellently on the breast, developed a cough, which persisted and became harsh. Asthmatoïd and indeterminate râles were noted in the lungs. The temperature was normal. At ten weeks, pin-head sized papules appeared on the thighs, neck, face and body; these papules developed into vesicles and then presented umbilicated caseonecrotic centers which could be shelled out. It was at this time—the infant being twelve weeks old—the indeterminate râles persisting and cough continuing, that we diagnosed the skin lesions as tuberculides. The third cutaneous von Pirquet was positive. The infant was then sent to New York Nursery and Child's Hospital, where he died several weeks later. Autopsy revealed a diffuse, caseous pulmonary tuberculosis with markedly enlarged tracheobronchial lymph nodes.

The note of interest here is the observation of the development of a rare and extremely important skin lesion, which enabled us to change our antemortem diagnosis from that of a chronic bronchitis to pulmonary tuberculosis.

Congenital Heart Disease Without Murmur and Persistent Cyanosis.—This infant was born cyanosed, which persisted and was not relieved by crying or oxygen administration. The child lived for 5½ months, and throughout its life no murmur could ever be elicited, although the child returned to the clinic three times a week for examination. Gallop rhythm was heard quite frequently. The absence of murmur and the gallop rhythm were corroborated by several pediatricians. X-ray examinations disclosed nothing of diagnostic value. The blood study showed a polycythemia. At 4½ months the infant, who had been doing well up to this period, had several attacks of severe cyanosis (the cyanosis ordinarily having been of a livid greyish blue color) and was sent to the New York Nursery and Child's Hospital. At 5½ months the child died of cardiac failure.

Autopsy revealed congenital heart disease with the following complex malformations: a single auricle and a single ventricle (cor biloculare), with persistent truncus arteriosus and no septa separating the two auricles and the two ventricles; but an auriculoventricular septum separating the common auricle from the common ventricle. The pul-

monary veins were definite, but the pulmonary arteries were represented by small branches coming off the truncus arteriosus.

Comment.—There was no doubt of this case being a true congenital heart without ever showing any murmur; and it would appear that the persistent cyanosis (*morbis ceruleus*) can only be accounted for by such an incomplete heart, when this symptom is not due to pulmonary stenosis.

CONCLUSION AND SUMMARY

As we stated in our introduction not enough is being done for the proper care of the newborn and the training of the young mother. Clinics have been established for nutrition, etc., but a gap exists between the time when the mother leaves the maternity hospital and the time that she first seeks medical advice for her baby. This results in the development of many preventable conditions, and the impeded progress of her infant. We believe that this situation can be corrected best by the establishment of postnatal clinics in the maternity hospitals under the direction of pediatricians.

In recording our observations it has been our purpose to show what can be accomplished in such clinics:

1. In teaching the mother the proper hygiene and management of her child.
2. In the encouragement and maintenance of breast feeding.
3. In the prevention of disease and the correction of minor ailments.
4. In the opportunity afforded the physician to study the normal development, anomalies and diseases of the newborn.

13 EAST 65TH STREET.

266 WEST END AVENUE.

THE USE OF PITUITARY EXTRACT IN LABOR

BY BERNHARD STEINBERG, M.D., RICHMOND, VA.

(From the Department of Obstetrics, Medical College of Virginia, Hospital Division)

WITHIN the last few years the pendulum has been swinging violently back and forth in the employment of pituitrin in labor. Much has been demonstrated clinically for and against its use but only recently has any attempt been made to prove the clinical observations experimentally.¹ The writer has combined a clinical and experimental study on a number of unselected cases, the results of which are set forth in this paper.

In 1895 Oliver and Schaefer demonstrated the pressor action exerted by the extract of the posterior lobe of the pituitary body. Some years later, Dale showed its action on uterine muscle. However, not until 1909 has the attention of the medical profession been focused on the possible use of pituitrin in obstetrical practice. In that year Blair Bell employed it in postpartum hemorrhage, placenta previa and following cesarean section. Within a few years the extract had become so popular and universal that even midwives resorted to its use. Hardly an instance of normal or difficult labor seemed to contraindicate its use. Operative obstetrics was relegated to the past and pituitrin came forward as the panacea for difficult labor. Being employed universally, fatalities that resulted from other causes were ascribed to pituitrin. Cases of uterine rupture, asphyxiation and fatal compression of the fetus, and premature separation of the placenta were reported. As a natural consequence, a reaction took place and pituitrin was banished from the domain of obstetrics. It suffered an uncommon fate. Lack of knowledge of its indications and its indiscriminate use forced a very valuable remedy into disrepute.

METHOD OF STUDY

There are four divisions in parturition where pituitrin is employed: (1) To induce labor;² (2) During the first stage of labor; (3) During the second stage of labor;³ and (4) After expulsion of the placenta.

The writer has made clinical observations on 60 unselected cases at the Mission Dispensary, Boston, Mass., and corroborated them by pharmacological experiments on patients in labor. The 60 patients included 21 primiparae and 39 multiparae. The multiparae varied from parae II to parae XII. Pituitrin was administered hypodermically into the muscle of the arm in doses varying from $\frac{1}{4}$ to 1 c.c., during the various periods of the first and second stages, and after delivery of the placenta. Clinical observations were made on the

following factors: (1) Time between injection and effect; (2) Length of time of total action; (3) Length of time of individual contractions; (4) Severity of contractions; (5) Relation to stage of labor; (6) Effect on primiparae and multiparae; (7) Injuries to cervix and perineum; (8) Presence of constriction rings of uterus; (9) Effect on the baby; and (10) Condition of uterus before and after expulsion of the placenta.

In these cases onset of contractions and their duration were judged by the palpating hand, the most accurate clinical method available. Frequent vaginal examinations were made during uterine contractions to ascertain the effect on the cervix and perineum.



Fig. 1.—Patient early in the first stage. The Voorhees bag inserted into the uterus and attached to a mercury manometer and recorder. Time in seconds. Each wave represents a uterine contraction. At the height of each contraction the readings in mm. of mercury were recorded.

A second series was undertaken on six unselected cases, 2 primiparae and 4 multiparae at the Medical College of Virginia, Hospital Division. Five were in the first stage of labor and in the sixth case labor had not begun. The purpose of this series was to obtain accurate information concerning the nature of uterine contractions induced by pituitary extract. This was accomplished by inserting Voorhees bags through the cervical canal into the uterus and connecting the bag with a mercurial monometer from which a recorder produced tracings on a moving kymograph. Fig. 1 represents normal uterine contractions early in the first stage of labor. Readings in mm. of mercury were charted at the height of each contraction. Fig. 2 is a tracing of uterine contractions induced by pituitrin.

In order to obtain more distinct tracings, the mercury manometer

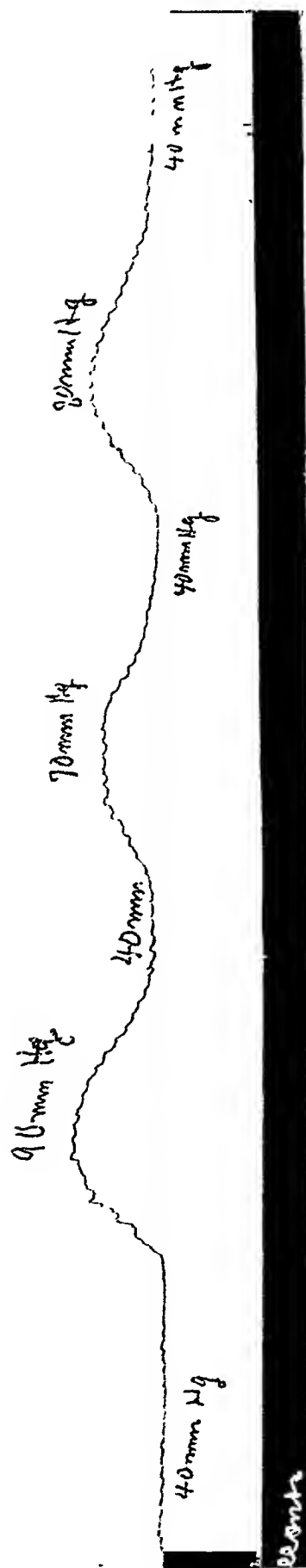


FIG. 2.—Patient in coma. Voorhees bag inserted into uterus and connected to mercury manometer and recorder. Two minims of pituitrin administered. Time in seconds. At the height of each contraction, readings in mm. of mercury were recorded. Note that each contraction returns to the base line, corresponding to 10 mm. of mercury. In this case labor was initiated with pituitrin. Note the close similarity to normal contractions.

was dispensed with in one case and recorder attached directly to the bag. Variations in pressure were obtained by means of a rubber membrane between the recorder and the bag. The water in the bag when under increased pressure from a uterine contraction pressed on the membrane and lifted the lever. Fig. 3 is a tracing of a normal

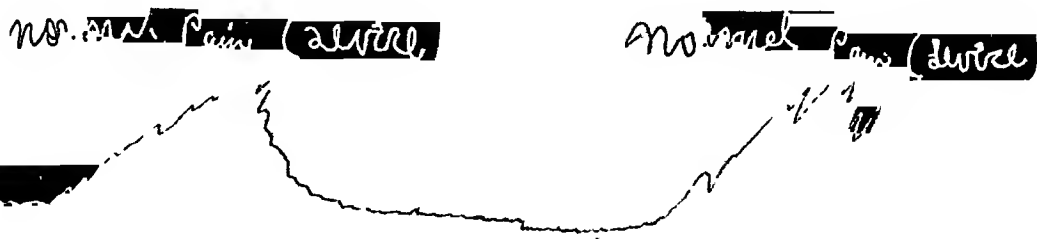


Fig. 3.—Patient early in the first stage. The Voorhees bag inserted into the uterus and recorder attached directly to bag. The two large waves are normal contractions of uterus. The small, superimposed waves are due to patient straining as well as respiratory movements. The time is in seconds. Note the short time of each contraction and the relative short interval between them.

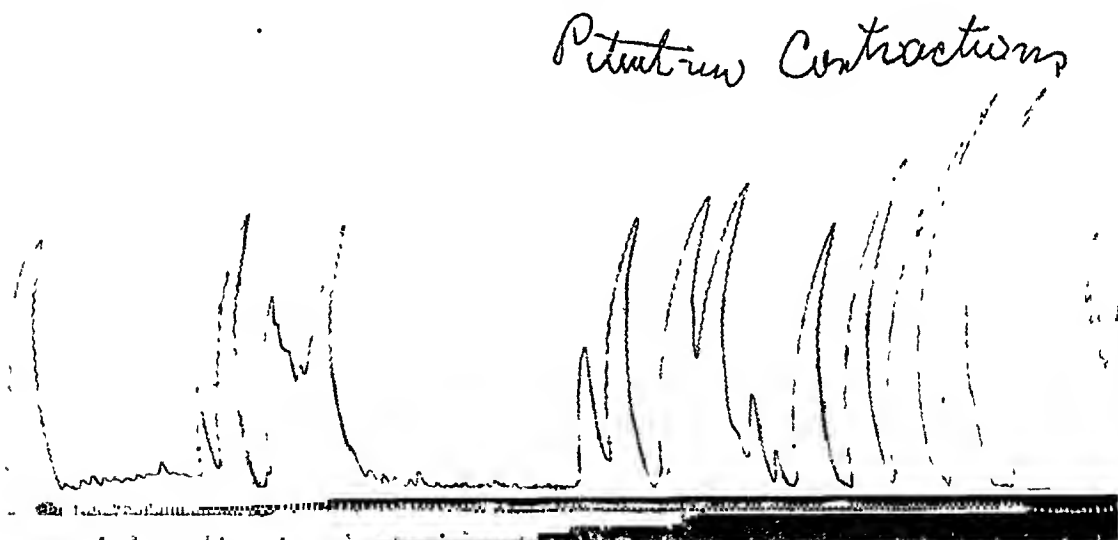


Fig. 4.—Same patient as in Fig. 3. Four minims of pituitrin administered. Time in seconds. Note the very short time of each contraction and each one reaching the base line. The two "camel back" contractions lasted only 12 seconds and then reached the base line. Note the long intervals between series of contractions. The pituitrin contractions came faster than the normal and the intervals between them were shorter.

uterine contraction. Fig. 4 represents uterine contractions induced with pituitrin.

Different methods were tried to obtain records of uterine contractions, but the one employed appeared the most satisfactory. External hysterography by means of modified pneumographs, elastic

bands, and those by Rübsamen's method proved unreliable, due to numerous extraneous factors. Abdominal contractions, respiratory motion, voluntary movements, and even pulsations of abdominal aorta obscured and modified whatever uterine tracings obtained.

RESULTS

In the series of 6 cases we obtained definite findings. The time between injection of pituitrin and its demonstrable effect on the uterus varied between one and a half and five minutes, the average being four minutes. Length of individual contractions was greater during the early part than at the end of the first stage. During the first half of the first stage the average time for each contraction was 58 seconds. In the latter part of labor contractions averaged 10 seconds but the intervals between them were greatly reduced. The intervals between contractions induced by pituitrin averaged 53 seconds. Longer periods of rest intervened between several contractions allowing the uterus a longer relaxation. The strength of uterine contractions measured in mm. of mercury averaged 71.5.

Normal contractions not induced by drugs lasted at an average of 73 seconds and the intervals between pains 83 seconds. The strength of contractions was at an average of 47 mm. of mercury.

NORMAL CONTRACTIONS

LENGTH OF TIME OF EACH CONTRACTION IN SECONDS	TIME OF INTERVALS IN SECONDS	STRENGTH OF CONTRACTIONS IN MM. OF MERCURY
56	93	40
80	90	55
61	90	45
66	101	60
62	65	35
66	62	
58	86	Average—47
54	86	
78		
59	Average—83 seconds	
61		
Average—73 seconds		

PITUITRIN CONTRACTIONS

LENGTH OF TIME OF EACH CONTRACTION IN SECONDS	TIME OF INTERVALS IN SECONDS	STRENGTH OF CONTRACTIONS IN MM. OF MERCURY
50	30	70
55	49	60
55	90	70
67	38	90
55	40	70
63	52	80
63	54	75
65	60	70
54	55	70
52		60
Average—53.1		
Average—57.9		Average—71.5

In the 60 cases where clinical observations were conducted the time for pituitrin to take effect varied between 3 to 5 minutes. These observations were made in instances of uterine inertia where the patient ceased to have uterine contractions for a considerable length of time. Pituitrin was injected and the first appearance of contractions was assumed to be due to the drug. The length of each contraction lasted from 30 seconds to 90 seconds. The intervals between the contractions varied between 40 seconds and 2 minutes. It was observed that in primiparae contractions were stronger and lasted a shorter time than in multiparae. The pains were universally more severe than the normal. It was a matter of no particular skill to recognize pituitrin contractions. From a $\frac{1}{4}$ to 1 c.c. of the Parke and Davis preparation was used.

In no case did we initiate labor with pituitrin. Out of 7 cases with an os dilated 3 fingers, the head engaged and in the superior or middle strait with a $\frac{1}{4}$ c.c. of pituitrin, the baby was born within from 11 to 20 minutes. In 3 cases, out of the 7, there was a unilateral laceration of the cervix. In 6 cases, where the os was one or 2 fingers open and head engaged, contractions were stimulated and a rapid dilatation occurred without lacerations. But cervical lacerations are very apt to occur in these instances, as evidenced by the tension the cervix was subjected to and felt by the fingers of the writer. In the remaining 47 patients, pituitrin was administered when the os was fully or almost fully dilated, or the head on the perineum. In these cases, in the writer's opinion, there were definite indications for the employment of the drug. It was used in the following conditions: (1) In 16 cases of uterine stasis with the head arrested in the perineum; (2) In 12 cases where the patient had a prolonged labor with marked fatigue, the os was nearly fully dilated and head engaged; (3) In 8 cases of uterine inertia, the head arrested in mid-straits, os almost fully dilated and dilatable; (4) In 7 cases where contractions were getting weaker with above conditions present, and (5) In 4 cases with fetal complications as evidenced by change of heart sounds, head in mid-straits, os 4 fingers dilated and dilatable. In no instance was there any physical disproportion between the baby and the pelvis. Only one out of the 60 cases had a perineal laceration. The perineum was routinely ironed out manually. In one instance the breech was presenting.

In the 60 cases we have not noticed any fetal complications. No postpartum hemorrhage or maternal complications occurred. It was observed however, that if the birth was not accomplished within 30-40 minutes after administration of pituitrin, the third stage was prolonged from 10 to 20 minutes. One c.c. of pituitrin has been given in some cases after expulsion of the placenta. This tends to shut the sinuses and prevent accumulation of blood within the uterus.

Pituitrin was administered in the triceps of the arm. The area was scrubbed with soap and water. The hypodermic syringe and needle were boiled for a few minutes. No alcohol was used in sterilizing the area or the syringe, as it inhibits the action of pituitrin.

CONCLUSIONS

Pituitrin almost simulates in its action normal uterine contractions. Pituitrin pains are stronger, they do not last as long as normal pains and the intervals between pains are shortened. At no time was there tetany produced in our cases. When given in the first stage of labor, before complete or almost complete dilatation of the cervix, cervical lacerations may result. In any pelvic malformation where the fetus is not expected to adapt itself to the passages, pituitrin should not be used. In those patients with repeated pregnancies, over 10, the uterus is apt to rupture under normal conditions and hence any additional force in form of pituitrin is dangerous. Contractions induced with pituitrin to initiate labor simulate normal contractions more than those which are induced during labor. Those labors hastened with pituitrin are less apt to develop cystoceles and rectoceles by shortening the time of pressure by the baby on perineal structures.

Pituitrin is indicated in the following conditions: (1) Prolonged labor; (2) Patient getting exhausted; (3) Uterine contractions getting weaker; (4) Uterine stasis with head in perineum, and (5) Fetal complications. In these indications the following conditions must be present: (1) Normal pelvis; (2) Engagement of the presenting part; (3) Fully, nearly fully or dilatable os, and (4) Preferably membranes ruptured.

In fact, any indication for forceps indicates use of pituitrin. Forceps necessitate the use of anesthesia, produce lacerations, endanger the fetus and expose the patient to infection by manipulation.

If the action of pituitrin simulates normal contractions we can assume that in small doses, as tried in one of our 6 cases, labor can be initiated.

REFERENCES

- (1) *Haskell, C. C., and Rucker, M. P.*: AM. JOUR. OBST. AND GYNEC., 1922, iv, No. 6. (2) *Watson, B. P.*: Pituitary Extract in Induction of Labor, AM. JOUR. OBST. AND GYNEC., 1920, i, 70. (3) *De Lee*: Principles and Practice of Obstetrics, p. 581. *Williams, J. W.*: Text-book of Obstetrics, p. 718. *Tweeddy and Wrench*: Practical Obstetrics, p. 283.

THE ROSENTHAL LIVER FUNCTION TEST IN OBSTETRICS.

(Preliminary Report)*

BY O. S. KREBS, M.D., AND W. J. DIECKMANN, M.D., ST. LOUIS, MO.

(From Department of Obstetrics, Washington University School of Medicine.)

PHENOLTETRACHLORPHTHALEIN was first prepared in 1908 by Orndorff and Block. In 1909 its properties were described; among them that it is excreted principally through the bile into the duodenal contents by the activities of the hepatic epithelium. In 1913, Rowntree, Hurwitz and Bloomfield advocated its use to determine functional activity of the liver in man. In dogs with biliary fistulae, they demonstrated that the dye appeared in the biliary secretion in fifteen minutes; also that in the collected feces of 48 hours, from 35-55 per cent could be recovered. Whipple, Mason and Peightal in 1913, showed by producing liver injury through phosphorus poisoning, prolonged chloroform administration, the induction of inflammatory processes or by alterations in the circulatory balance, that there was a decided fall in the dye output—that the percentage of output corresponded inversely to the amount of the injury produced and as repair took place the dye output proportionately increased. McLester and Frazier, 1915, and Kahn and Johnston, 1915, reported unfavorably on it owing to the variation in figures they found between normal and definitely pathological hepatic cases. Sisson, Chesney, Marshall and Rowntree, 1914, concluded that outspoken changes in liver function can be demonstrated by the test. Krumbhaar also believes the test has considerable possibilities for determining the functional capacity of the liver.

The disadvantages of the methods above used were: first, the necessity of a fresh preparation for each test due to the instability of the dye; secondly, difficulty in collecting all the feces passed in 48 hours; thirdly, the absorption of some of the dye by the large bowel; fourthly, the elaborate technique associated with the injection of a large amount of the fluid into the veins.

In 1916, McNeil modified the procedure. He inserted a duodenal tube, injected the dye into the veins, collected the duodenal contents, estimated the time of its first appearance and the percentage recovered over a period of two hours. Kahn, July, 1921, used the injection of phenoltetrachlorthalein to study the efficacy of the method of Lyons to stimulate the flow of bile into the duodenum. Traces of the dye appeared in the duodenal contents within twenty minutes of the administration and the administration of magnesium sulphate in-

*Read before the St. Louis Medical Society, May 15, 1923.

traduodenally markedly stimulated the flow of bile as measured by the phenoltetrachlorophthalein output.

In 1921, Aaron, Beck and Schneider introduced a stable preparation of the dye. They reported 7 abnormal liver cases where the appearance of the dye varied from 15 to 75 minutes, averaging about 35 minutes; also 16 normal cases in which the time of the appearance of the dye varied from 14 to 20 minutes with the average of 17.2 minutes. They emphasized that the time of the appearance of the dye is important, and not the total quantity recovered. They felt that if its first appearance is delayed more than 20 minutes one should be suspicious of hepatic involvement.

In December, 1922, Rosenthal presented a new method dependent on the length of time the dye remains in the blood stream or the ability of the liver to remove the dye from the blood stream. Standards were prepared and matched with the unknown plasmas. The principle of the method is briefly as follows: 5 mg. of the dye per kilo of body-weight are injected intravenously. This dosage is normally removed from the blood stream very rapidly. In normal human beings 2-6 per cent is present in the plasma fifteen minutes after the injection, and practically complete disappearance takes place within from 40 to 60 minutes. In cases of liver disease, high percentages may be found in the plasma for many hours after injection. The same author presented 10 normal individuals and 10 cases of extrahepatic disease and finds normal curves in all cases. He found high degrees of retention in cases of hepatic disease.

In March, 1923, Deakin and Graham concluded that phenoltetrachlorophthalein is not a satisfactory substance to use in an hepatic functional test based on the quantitative estimation of the output in the bile.

Rosenfield and Schneiders, December, 1922, applied the test in pregnancy and its toxemias. In six cases of normal pregnancy in the third trimester, there was no retention of the dye in the blood. Figures were practically the same as in normal non-pregnant women. They studied 16 toxemic cases: In the neurotic and toxic vomiting group (7 cases) there was a very definite relation between the degree of toxicity of the patient as evidenced by the clinical picture and the degree of functional impairment of the liver as evidenced by the test. The question arises as to the anticipation of the clinical picture by the results of the test. The method has proved valuable in diagnosing the neurotic type of vomiting. In the hypertension group the results indicated that there has been liver function impairment in every case in which there has been sufficient clinical evidence to warrant a diagnosis of pre-eclampsia or eclampsia. Wherever the clinical picture showed a considerable degree of toxicity, curves were obtained which indicated corresponding degrees of impairment of function. In several instances, however, the test indicated degrees of toxicity more severe than the corre-

sponding clinical picture suggested. Further development in these patients, however, showed definite accentuation of the clinical symptoms, suggesting that the test curve preceded the clinical picture in evidencing toxicity.

Hourly blood pressure estimation in cases of pre-eclamptic toxemia have shown variations at various intervals, fluctuating from considerable degrees of hypertension to approximately normal levels within short periods of time, in cases in which the test curve has consistently shown definite impairment and in which subsequent developments proved definitely marked toxicity. This suggests that greater reliance might be placed on this test than on blood pressure determinations or other variable clinical symptoms. Whenever, in cases of toxemia the patients have been relieved from symptoms, either by treatment or delivery, the test curves have fallen to normal limits, showing rapid return to normal liver function. The time required in these cases apparently varies directly with the degree of liver impairment.

The material we are presenting is merely a preliminary report on a series of liver function tests by the Rosenthal method done on patients on the obstetrical service of Barnes Hospital and the Washington University Dispensary.

NORMAL CASES

NO.	AGE	GRAV.	GESTA- TION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15'	60'	120'
1 B.	20	iii.	14	92/56 to	No. Alb.	Constipated			
2 W.	23	ii.	18	108/58		Headaches	7	0	0
				110/70	No. Alb.	None	7	0	0
3 B.	21	i.	18	94/54 to	No. Alb.	Headaches			
				110/78		relieved by catharsis	3	0	0
4 B.	24	iii.	24	116/78 to	No. Alb.	Headaches			
				120/80		only very rarely	6	0	0
5 B.	20	i.	24	106/60	No. Alb.	None	2-	0	0
6 W.	23	i.	26	105/68		Headaches			
					No. Alb.	Ethmoid Sinusitis	2	0	0
7 B.	18	i.	29	102/70 to	No. Alb.	None			
				105/72		None	3	0	0
8 B.	29	iii.	30	104/62	No. Alb.	None	4	0	0
9 W.	?	i.	30	110/50		None	3	0	0
10 B.	18	ii.	33	102/60 to	No. Alb.	None			
				104/60		None	5	0	0
11 B.	17	ii.	38	98/70 to	No. Alb.	None			
				112/78		None	7	0	0
12 W.	29	ii.	39	110/62 to	No. Alb.	None			
				126/70		None	4	0	0

The above series is one of cases of normal pregnancy at various periods of gestation. All the readings are within normal limits. There is no apparent difference in the removal of the dye from the blood stream in the various stages of pregnancy. Tests have not as yet been run on the same patients at several stages of the same pregnancy.

PRE-ECLAMPTIC TOXEMIA

NO.	AGE	GRAV.	GESTA- TION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15'	60'	120'
1 W.	23	i.	40	124/90 to 154-84	Trace Alb.	Vomiting. Edema of extremities. Headaches Headaches Epigastric burning Edema. Spots before eyes Decreased urination. Epigastric burning.	10	8	2-
2 W.	29	ii.	29	102/78 to 210/130	Trace Alb.	Headaches Epigastric burning Edema. Spots before eyes Decreased urination. Epigastric burning.	14	6	4
3 W. a.	17	i.	37	128/82 to 138/90	Trace Alb.	Headaches Epigastric burning.	7	9	4
b.	4 wks. later		Post- Partum	110/70	Very faint trace	None	5	2-	0
4 W. a.	19	i.	40	102/68 to 136/72	Faint trace	Headaches Sleeps poorly Epigastric burning.	6	3	0
b.			Post- Partum	110/65	Very faint trace	Delivered of macerated fetus	6	0	0

Cases 1 and 3 complained of headaches and constipation. Relief of the latter was followed by disappearance of the headaches, so they were probably not of toxic origin and we should not expect any liver impairment, as the tests show.

Case 4 was troubled with very severe headaches due to an ethmoidal sinusitis.

Case 1 gave the rather typical history of pre-eclampsia. The non-protein nitrogen and uric acid determinations in the blood were normal, as was the phenolsulphone-phthalein kidney functional test. We considered this case to have moderate liver impairment. No test was run in this case following delivery.

HIGH BLOOD PRESSURE CASES WITH SYMPTOMS

NO.	AGE	GRAV.	GESTA- TION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15'	60'	120'
1 B.	27	v.	31	105/70 to 132/78	Very faint trace	Nausea Vomiting Headaches Edema	7	3	0
2 B.	16	ii.	32	110/78 to 130/90	No Alb.	Headaches Vomiting Headaches Edema	8	5	0
3 B.	23	i.	29	110/66 to 164/104	Very faint trace	Headaches Sleeps poorly	7	5	0
4 B.	18	i.	33	135/85 to 146/90	No Alb.	Headaches Constipated	10	6	0
5 B.	22	i.	30	120/70 to 140-90	No Alb.	Headaches Edema	5	3	0
6 B.	24	iii.	31	110/65 to 146/88	No Alb.	Headaches Headaches Vomiting Edema of	6	4	0
7 B.	27	vi.	13	268/170	Mod. amount Alb. Casts	Fert. Nausea Blurred vision	6	0	0

Case 2 gave a history of severe toxemia in the previous pregnancy. Patient was sent to the hospital because of rapidly rising blood pressure, headache and severe epigastric discomfort. Patient went into spontaneous labor; delivered of a premature stillborn fetus. The test was not run until the 5th day postpartum and showed very marked liver impairment. Subsequent tests were not done because of inability to find suitable veins.

Case 3 entered the hospital with symptoms of pre-eclampsia. The liver function test showed marked liver impairment. Clinically the patient improved rapidly under eliminative treatment and was discharged from the hospital. Another test was run four weeks later, which was ten days postpartum, and it gave normal findings.

Case 4 entered the hospital with symptoms of mild pre-eclamptic toxemia. Liver test showed very slight liver impairment. Patient delivered of a macerated fetus the next day. Test repeated postpartum was normal.

Several of these cases are of particular interest.

Case 2 had the test when blood pressure and urinalysis were normal. One week later patient returned with a blood pressure of 130/90 (previously it was 110/70) and a small amount of albumen in the urine. The test showed moderate impairment of liver function. This case would suggest that the liver damage anticipates the blood pressure elevation and urinary findings.

Case 5 had a blood pressure of 164/104 during pregnancy, with lowering of the same when on diet and eliminative treatment. Blood pressure has always been slightly elevated since its greatest height was reached and test was run after patient was treated. Test showed a moderate impairment suggesting that a potential toxemia existed.

Case 6 was a patient who had an elevated blood pressure throughout previous pregnancy.

Case 7 entered hospital in very early pregnancy with a history suggestive of chronic nephritis. Patient has had one premature delivery and 3 spontaneous miscarriages at 6 and 7 months gestation. The liver function test was normal. We consider the test in this connection as a means of probably differentiating renal from hepatic toxemias.

HIGH BLOOD PRESSURE CASES WITHOUT SYMPTOMS

NO.	AGE	GRAV.	GESTA- TION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15'	60'	120'
1 B.	24	iii.	36	128/78 to 148/78	No Alb.	None	3	0	0
2 B.	21	iii.	39	124/65 to 134/86	No Alb.	None	8	7	0
3 W.	22	ii.	36	120/70 to 140/70	No Alb.	None	11	4	0
4 B.	22	i.	30	120/74 to 138/76	No Alb.	None	3	0	0
5 W.	23	iv.	28	124/75 to 144/88	No Alb.	None	6	0	0
6 B.	24	ii.	27	128/76 to 148/82	No Alb.	None	7	3	0

The above series shows one-half of the cases with normal liver tests and the other with very moderate impairment. It will be interesting to follow these cases further during pregnancy to see if any of them later develop toxic symptoms. What in these cases without liver im-

pairment the blood pressure elevation is due to, we cannot say; however, it seems reasonable to assume that in these cases with liver impairment the elevated blood pressure is due to a toxemia which has not produced symptoms as yet.

NORMAL BLOOD PRESSURE WITH SYMPTOMS

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15'	60'	120'
1 B.	18	i.	35	112/68 to 118/74	No Alb.	Headaches for 2 wks. Constipated Nausea Vomiting Headaches Edema of feet	7	3	0
2 B.	19	ii.	26	105/60 to 112/58	Very faint trace	Headaches Edema of feet	5	3	0
3 B.	21	i.	32	120/80 to 124/76	No Alb.	Headaches Edema of feet	8	4	0
4 B.	32	iii.	38	110/64	No Alb.	Sl. Edema Sl. Headaches Constipated	5	3	0
5 B. a.	16	i.	39	95/50 to 120/64	No Alb.	Headaches Edema of ankles	7	4	0
b.			Post-Partum	110/56	No Alb.	None	4	1	0
6 W.	27	v.	38	115/78 to 128/78	No Alb.	Headaches Nausea Vomiting	6	5	0
7 W. a.	19	ii.	40	110/48 to 118/75	No Alb.	Frequent Headaches	11	5	0
b.			Post-Partum	110/70	No Alb.	None	5	2	0
8 B. a.	21	ii.	40	108/72 to 122/80	No Alb.	Edema	2-	8	5
b.			Post-Partum	110/70	No Alb.	None	7	0	0

In this series of cases we see there was from very slight to moderate impairment of liver function. In all of the cases the blood pressure was within normal limits and in only one case was there an albuminuria. No conclusions can be drawn from this series, but the subsequent behavior will be of utmost interest to determine whether the blood pressure will rise and urine will show albumen and, with the symptoms, indicate a toxemia which the liver test certainly suggests.

Cases 5 and 7 showed normal function and very slight impairment in tests made following delivery.

Case 1 entered hospital because of intractable vomiting. Urine was negative except for a positive acetone reaction. Non-protein-nitrogen of blood was normal, ammonia coefficient of urine elevated, plasma carbonate within normal limits. Liver function test was normal at this time.

Patient was given glucose intravenously and by rectum. After treatment for several days and assurance that pregnancy must continue, patient's symptoms improved. Two days after cessation of vomiting and with marked subjective improvement the repeated test gave a normal result.

MISCELLANEOUS CASES

NO.	AGE	GRAV.	GESTA- TION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15'	60'	120'
1 W. a.	38	viii.	11	110/60	No Alb. Acetone	Extreme Vomiting	5-	0	0
b.	1 week later			115/60	Faint trace alb. Acetone +	No vomiting for 2 days. Clinically improved.	4	2-	0
2 W.	42	?	2	120/80	Large amount Alb.	Puerperal Sepsis. Died 10 days later	14	14	14
3 W. a.	32	v.	36	110/74	No Alb. Acetone +	Recent vomiting, otherwise none	12	6	5
b.	Delivered dead fetus		Post- Partum	120/70	No Alb.	Psychosis before delivery. Anuria. None now	5	0	0
4 B.	38	Not pregnant		226/130	Large amount	Headaches. Dizziness. Blurred vision	12	0	0
5 B.	43	xii.	16	120/90 to 175/120	Mod. amount	Blurred vision. Arterio- sclerosis Headaches.	8	3	0
6 W.	23	ii.	26	110/60	Trace	Advanced Pulmonary Tbc	2	0	0

Case 2 entered hospital as suffering from a puerperal infection following criminal abortion. Patient died of a general peritonitis. Liver test ten days before death proved very marked liver impairment. Section of the liver removed at autopsy showed considerable fatty infiltration around central vein, rather large amount of hemosiderin throughout section, rather marked round cell infiltration about portal spaces, but section generally showed liver not to be badly damaged, probably because of forced intravenous glucose administration.

Case 3 entered hospital with history of recent inability to retain food. The urine showed a strongly positive acetone reaction. The liver function test at this time showed very marked liver impairment. Several days later the patient developed a psychosis, an anuria with a non-protein-nitrogen in the blood of 83 mg. per 100 c.c. Patient went into premature labor and delivered a dead fetus. Ten days after delivery, when the N. P. N. was down to 29 mg. per 100 c.c. and the patient clinically well, without symptoms, the liver function test was normal.

Case 4 entered hospital as suspected nephritic toxemia. On examination patient was found not to be pregnant. The diagnosis of myocarditis, chronic cardiac valvular disease and chronic diffuse nephritis was made. The liver function test was practically normal.

Case 5 entered hospital with albuminuria and high blood pressure, complaining of headaches and blurred vision. Patient had a marked arterio-sclerosis, general. With bed rest symptoms abated and blood pressure dropped considerably. Liver function test on admission showed very slight impairment.

Case 6 entered hospital as a case of advanced tuberculosis and pregnancy of 26 weeks. Liver test normal.

BEFORE AND AFTER DELIVERY

NO.	BLOOD PRESSURE	URINE	SYMPTOMS	TIME	TEST		
					15'	60'	120'
1 a	128/82 to 138/90	Trace Alb.	Pre-eclamptic	Before delivery	7	9	4
b	110/70	Very faint trace	None	After delivery	5	2-	0
2 a	95/50 to 120/64	No Alb.	Edema Headaches	Before delivery	7	4-	0
b	110/56	No Alb.	None	After delivery	4	1	0
3 a	100/48 to 118/75	No Alb.	Frequent Headaches	Before delivery	11	5	0
b	110/70	No Alb.	None	After delivery	5	2	0
4 a	110/74	No Alb.	Recent Vomiting	Before delivery	12	6	5
b	120/70	Acetone + No Alb.	None	After delivery	5	0	0
5 a	102/68 to 136/72	Very faint trace	Pre-eclamptic	Before delivery	6	3	0
b	110/65	Very faint trace	None	After delivery	6	0	0
6 a	108/72 to 122/80	No Alb.	Edema	Before delivery	7	8	5
b	110/70	No Alb.	None	After delivery	4	0	0

In this series of cases readings were taken before and after delivery. In all cases there were symptoms present before delivery and in some of them elevated blood pressure and albuminuria. In all of the patients there was some retention of the dye in the blood stream before delivery. After delivery the symptoms cleared up in every instance; the urine improved in all but one case, in which it remained the same. The blood pressure almost universally became lower. The liver tests, 10 to 12 days postpartum, were uniformly within normal limits.

CONCLUSIONS

We are not prepared to draw any definite conclusions from a series so small as this one; however, the test seems to offer considerable promise in indicating the degree of toxicity in certain cases, gives a clue as to the response to treatment in others, probably indicates impending clinical toxemia in some instances, enables us to differentiate neurotic from toxic vomiting, and gives a better idea of how to evaluate a patient's symptoms, and the functional capacity of the liver under the added strain of pregnancy.

INTRAPARTUM AND POSTPARTUM STREPTOCOCCUS SEPTICEMIA OF EXTRAPELVIC ORIGIN

BY SAMUEL A. WOLFE, M.D., BROOKLYN, N. Y.

THE occurrence of a systemic infection arising from an extrapelvic focus and accompanying labor and the puerperium is unique and warrants report.

CASE No. 446, 1921.—Mrs. J. M., para vi, was admitted in labor to Dr. Polak's Service at the Long Island College Hospital on January 26th, 1921. The patient had been under supervision in the prenatal clinic for three months. Previous labors and pregnancies normal. Present pregnancy uneventful until three days before admission at which time she complained of cough and sore throat.

Labor began noon January 26th. Notification of same at 8:15 P. M. Seen by outpatient service at 9 P. M. Examination showed temperature 102, pulse 116, respirations 24; face flushed; pharynx injected, few subcrepitant râles over both bases. Presentation R. S. A.; cervix 3 cm.; pains every four minutes. Admitted to hospital at 11:30 P. M. with similar findings. Blood count showed 9000 white cells, polys 83 per cent. Labor proceeded satisfactorily. At 8:50 A. M. (1/27) membranes ruptured spontaneously and living female was delivered spontaneously with the next two contractions. Third stage uneventful. Child weighed 3100 gm.; cried spontaneously but remained cyanotic. The progress of labor was followed throughout by rectal examination.

One hour after delivery temperature was 104, pulse 130, respiration 38. At this time throat showed white patch on left tonsil in addition to marked injection. Chest showed persistent râles. Second blood count 12 hours after labor showed (white cells, 24,000, polys 85 per cent; high for physiological count).

The puerperium was stormy and prolonged and can for purposes of brevity be divided into three phases.

The first period includes the 1st to 3rd days postpartum. In this interval the clinical course was characterized by absence of subjective symptoms. The physical signs in pharynx and lungs remained unchanged and uterine involution progressed normally. The temperature, however, continued a septic course and varied between 100s and 104 $\frac{1}{2}$; pulse persisted between 120 and 140 and respiration between 30 and 40 (see Fig. 2).

Laboratory Data:

1/28/22 (1st P. P.) W. B. C. 17,200, Polys 83 per cent.

Blood culture sterile.

Widal: Negative.

Stool: Negative for typhoid and paratyphoid.

1/29/22 (2nd P. P.) W. B. C. 10,000, Polys 80 per cent.

Cough controlled by heroin; heart good quality under caffeine stimulation.

The baby which was cyanotic at birth remained in this condition; dyspnea was marked and continued until its death at 11 P. M. on 1/27/22. Temperature was never above 99 $\frac{1}{2}$. The autopsy performed 1/28/22 showed septic bronchopneumonia and general septicæmia. The details are as follows:

Gross.—Umbilicus and umbilical vein normal. All abdominal viscera normal except for postmortem change.

Thorax reveals normal heart and pericardium. Lungs: Rt. floats but is heavy and dark red; scattered throughout are grey-red nodules 2-5 mm. in diameter corresponding sharply to the lobules. A mottling due to atelectasis is seen on the surface. Left lung in its upper lobe contains nearly three confluent areas of consolidation about 15 mm. in diameter. These are yellow-grey in color, soft and nearly fluid. A similar area is found in the posterior surface of lower lobe. Findings otherwise similar to right lung.

Brain: vessels over convexity show hypostatic congestion otherwise normal.

Microscopic.—Abdominal viscera show usual postmortem change in all organs.

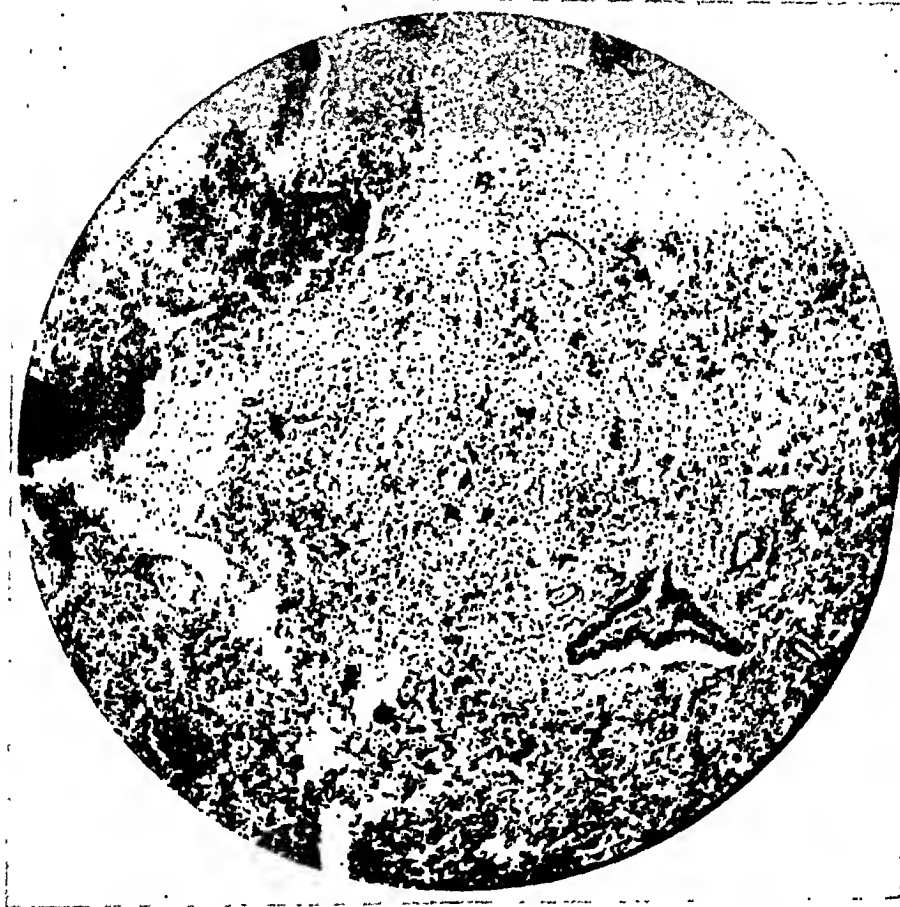


Fig. 1.—The microphotograph shows the severity of the interstitial form of bronchopneumonia of only 16 hours' duration. Note the necrotic area.

Chest: Lungs.—In many lobules the bronchioles are normal and lung tissue normal or collapsed. In others, bronchioles are filled with purulent exudate, walls normal but the adjacent alveoli are filled with exudate of mononuclears and transitionals with small number of polys and red blood cells. In other lobules bronchioles filled with pus which is partially necrotic and the adjacent alveoli (both exudate and lung tissue) are in state of necrosis. The septa are edematous and contain inflammatory cells. These findings are well shown in the microphotograph (Fig. 1).

Bacteriological.—Cultures from the lung, heart and spleen showed growth of hemolytic streptococcus.

Diagnosis: Septicemia; bronchopneumonia—(Interstitial).

Bronchopneumonic lesions more advanced and severe than ordinarily found for 14 hours' duration, suggesting antepartum infection.

The second phase of the puerperium includes the 4th to 10th days postpartum. Clinically it was marked by severe septic intoxication manifested by disorientation, and attacks of mania. The onset was sudden in the morning of the 4th day and was associated with cyanosis. Examination showed persisting patch on the left tonsil; throat injected; fine rales over both lung bases; heart sounds weak. Abdomen negative; uterus insensitive, 8 cm. above symphysis. Digalen in xx, q. 3 h; glucose-soda by Harris drip and scopolamine gr. $\frac{1}{200}$, hypodermoclysis 900 c.c.

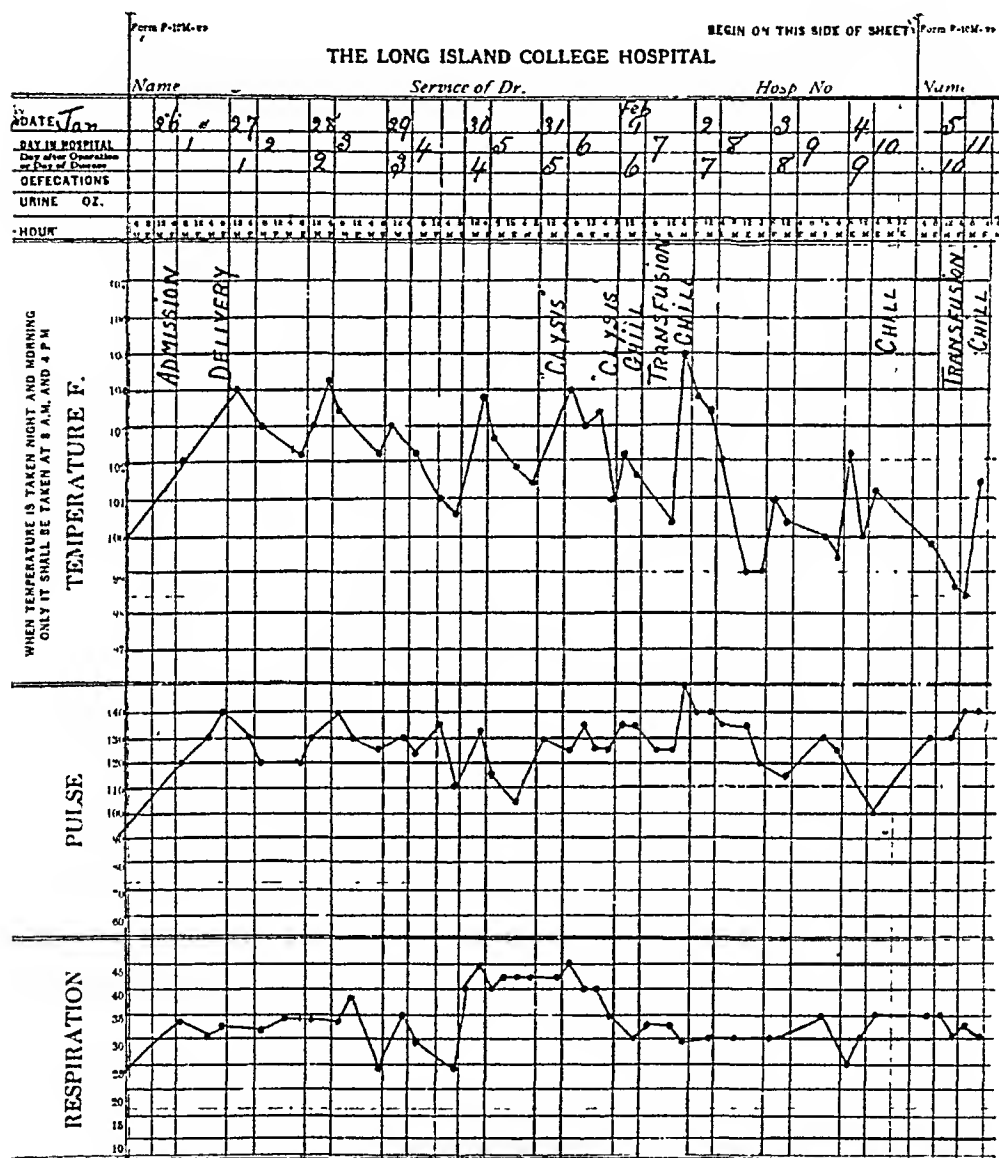


Fig. 2.—Shows the temperature, pulse and respiration for the first 10 days of illness. The fall in temperature following blood transfusion is striking.

On the fifth day patient was dull, apathetic and disoriented. A chill lasting 20 minutes occurred at 4 A. M. Blood transfusion of 300 c.c. was given at 7 P. M. by the citrate method. Following this the temperature fell, mentality cleared, patient taking medications and fluid greedily. This continued until the 8th day when mania recurred with rise of temperature. Examination showed patch on left tonsil gone and only an occasional rale.

On the ninth day remission set in, patient rational; sphincteric control regained;

pulse good quality with occasional rate over bases. A second transfusion of 275 c.c. given.

The temperature in the second phase varied from 101 to 104, the pulse between 103 and 150 and respirations between 20 and 40 (see Fig. 2).

Laboratory Data:

1/31/22 (4th P.P.) W. B. C. 6,000—P 82

Pharyngeal and tonsillar cultures show hemolytic streptococci with some staphylococci. Uterine culture shows hemolytic streptococci. The organisms obtained from the mother like those of fetal origin ferment lactose and salicin but not mannite and insulin and hence seem morphologically and biologically the same.

2/1/22 (5th P.P.) W. B. C. 6,000—P 72 Hb. 70

2/2/22 (6th P.P.) “ 8,000—P 85 Hb. 85

2/3/22 (7th P.P.) “ 9,000—P 82 Blood culture positive for hemolytic streptococci

2/5/22 (9th P.P.) “ 8,000—P 83

2/6/22 (10th P.P.) “ 10,000—P 72

The third clinical phase of the puerperium continued from the 10th to 55th day postpartum. This interval was characterized by numerous metastatic abscesses of the buttocks, thighs, legs and arms. The throat and chest symptoms disappeared. The pelvis was found normal on the 10th day with good uterine involution. General condition was excellent. The number of abscesses was twelve. These were deep, required incision and drainage. Cultures from the pus revealed hemolytic streptococci. The temperature remained 98° except for irregular rises with abscess development and dropped to normal with incision and drainage.

The patient was discharged on the 77th day, all abscesses fully healed; general examination negative. Pelvis normal except for old lacerations.

COMMENT

Review of the facts in this case lead to the following possibilities:

1. The streptococcus sore throat caused maternal antepartum bacteremia and in turn fetal infection. The pathological lesion in the child's lung of an interstitial type and the necrotic areas form quite a different picture from an aspiratory pneumonia which might have occurred at the time of birth. The type of lesion and its severity, associated with clinical symptoms of cyanosis and dyspnea at the time of delivery, point to a process beginning before birth and hence placental transmission and fetal septicemia. The streptococci recovered from the heart's blood, spleen and lungs show the latter. The pneumonia was secondary to the septicemia; interstitial pneumonia is a septic process.

2. The maternal infection persisted after labor as shown by finding the hemolytic streptococci in the uterus on the fourth day. These organisms showing the same sugar fermentations as those derived from mother's throat and fetal organs suggests infection of hematogenous origin rather than an ascending process from the vagina.

3. Recovery of organisms from the blood stream on the 7th day in

presence of severe toxic symptoms indicates septicemia. The disappearance of general symptoms with simultaneous occurrences of metastatic abscesses yielding the hemolytic streptococcus supports the clinical course of a septic pyemia.

4. The similarity in morphology and sugar fermentation of the organisms recovered from the uterus and blood stream to those from the mother's throat and fetal organs suggests a common source which by exclusion is to be the tonsil.

1530 PRESIDENT STREET.

ABDOMINAL PREGNANCY WITH FAVORABLE OUTCOME AT TERM—REPORT OF A CASE

BY CHARLES H. BROWN, M.D., F.A.C.S., WATERBURY, CONN.

CASES of abdominal pregnancy that almost run the course of a normal pregnancy, terminating in a healthy baby of normal weight and development, are, we believe, sufficiently rare to warrant the full report of such cases. The case here reported is of this kind, in which no untoward event was suffered by either mother or child.

The woman in question, Mrs. X, was thirty-five years old, with negative family and past history. She had undergone two pregnancies, normal except for the fact that her first resulted in a premature delivery at six or seven months, exact time not to be determined. However, the baby was raised in an incubator with little difficulty, and developed into a normal child of average good health. The two former children are now fifteen and eight years old respectively. There was no history of miscarriages nor symptoms pointing to any pelvic condition. The menstrual history was negative. Her periods had always been regular and were never marked by menorrhagia, dysmenorrhea, metrorrhagia, other abnormality. There was no history of vaginal discharge. Neisser infection and syphilis were denied and there was no evidence pointing to either.

I was first called in consultation to see Mrs. X in May, 1922. At that time she had skipped her last two menstrual periods, and complained of severe pain in the pelvic region with moderate hemorrhage from the vagina. This discharge did not have the characteristics of normal menstrual flow. It was redder in color and showed a tendency to clot. Her general condition was fair. A mass was made out on the right side of the pelvis, about 5 to 6 cm. in size, not attached to the uterus, exquisitely tender on palpation. Vaginal examination elicited extreme pain in the right fornix. At that time, I made a diagnosis of a mass in the right uterine tube, probably a tubal pregnancy, and the patient was impressed with the importance of prompt operative interference. Before consent to operation could be obtained, a matter of about thirty-six hours, the pain and hemorrhage both subsided rapidly. From this time until some months later, I lost sight of the patient but was told, from time to time, that she was going through what seemed to be a normal pregnancy.

On January 18, 1923, seven and a half months later, I was again called in consultation at 11 P.M. By the time I arrived, the woman had been in what appeared

to be normal labor for eight hours. She was having severe bearing down pains every four minutes. Examination showed a head low in the pelvis but the cervix could not be located by palpation. To facilitate a more complete examination, a little chloroform was administered. The cervix was then found high up in the vagina, very soft, the external os tightly closed, and so drawn posteriorly and upward, and flattened out to such a degree that it was difficult to distinguish from the vaginal wall. The uterus was felt to be slightly larger than normal, lying in the bottom of the pelvis, rendering it difficult to make out. A diagnosis of abdominal pregnancy was made and the patient rushed to the Waterbury Hospital.

The patient was etherized, and the abdomen opened by a median incision extending from the umbilicus nearly to the symphysis. A baby girl weighing seven pounds was delivered. The child appeared normal in size and development, respiration was established immediately and spontaneously, and no defect whatever could be found.

The placenta was adherent to the right tube, greater omentum, the mesentery throughout most of its length from the ileocecal valve upward, appendix, cecum and pelvic peritoneum. I found that by resecting part of the omentum and the right tube, a large part of the placenta could be delivered through the wound. This was done, an appendectomy performed, and the placenta freed from the cecum. Further placental separation was not considered advisable at this time, about three-fourths of the placenta delivered through the abdominal wound and the wound closed tightly about it. As there was slight bleeding from the placenta, it was tied as far down as possible with sterile tape. A dry dressing was applied. The right tube, removed at operation showed evidence of rupture, confirming the original diagnosis of a tubal pregnancy that had ruptured and continued to term as an abdominal pregnancy. Lactation was established in three days and was normal.

Three weeks after delivery, the remainder of the placenta had separated, was withdrawn from the wound, and the wound closed by sutures. During this period, the course of the mother was uneventful, and she showed rapid recovery and gain in strength after the operation. The child was at no time other than a normal newborn infant. Both were discharged from the hospital in perfect health six weeks after delivery. The last three weeks of their stay was for observation only. They could both have left at least two weeks sooner, if their discharge had been governed by symptoms.

175 COLUMBIA BOULEVARD.

CHRONIC ULCER OF VAGINA OF UNDETERMINED ORIGIN

BY ISIDOR KROSS, M.D., NEW YORK

Adjunct Gynecologist, Mt. Sinai Hospital.

THE patient is a well nourished woman 34 years old and was first seen December 31, 1921, in the out-patient department of the Gynecologic service of Mt. Sinai Hospital (Dr. Jos. Brettauer, Director). Her history for past illnesses is a negative one. Her menstrual history is quite normal. She was married at the age of 17 and has conceived 6 times. Her first child is alive and well. The second died when three months old. The third was a full term stillbirth. The last three conceptions resulted in spontaneous abortions. Her husband died of insanity in his forty-fourth year. For some time prior to his death, he was treated for a blood disease. The present illness dates back four and a half years and began with frequent and painful urination. At times, there would occur retention of urine necessitating catheterization.

Except for the local condition, no abnormalities of any kind were found. On the distal portion of the anterior vaginal wall, beginning just below the clitoris, there is seen an ulcer which is approximately one and a half inches in diameter. In the central part of this lesion, the opening of the urethra can be made out. The edges of the ulcer are sharply punched out, slightly undermined and not infiltrated. The base is composed of sluggish, flabby hemispherical masses of granulation tissue varying in size from one-sixteenth to one-quarter inches in diameter. In appearance, these granuloma masses are of marked pallor. A thin layer of grayish mucopurulent secretion covers the base of the ulcer. Palpation is painless and does not cause any bleeding. Neither is the tissue friable. The inguinal glands are not enlarged nor are they painful.

In attempting to reach a diagnosis, the following conditions were considered: (1) Ulcerating malignant growth. (2) Ulcerating gumma. (3) Tuberculous ulcer. (4) Tropical ulcer, the latter in spite of the fact that the patient is a native of Russia and has never been in the tropics.

The Wassermann blood test was negative.

A provocative Wassermann test was also negative.

Smears from the secretion and smears from the superficial curettings of the base of the ulcer revealed no pathogenic organisms, search being especially made for the tubercle bacillus.

Numerous urine examinations always showed many pus cells, but never any tubercle bacilli.

Special search was made on two separate occasions from the secretions and from the superficial curettings of the base of the ulcer for Donovan bodies or the bacillus mucosus capsulatus of Friedlaender as described by Walker. These organisms are pathognomonic for *granuloma pudendi*. These tests also were negative.

A specimen of tissue removed from the edge of the ulcer was examined histologically and showed an intense inflammation of the sub-

epithelial tissue. There was no evidence of malignancy, tuberculosis or syphilis.

In spite of all these negative findings, it was decided to administer a course of antisyphilitic treatment as a therapeutic test, especially in view of her husband's history of insanity and of her own repeated abortions. On March 30, 1922, after the patient had received four intravenous injections of salvarsan, she was again examined. It was now noted for the first time that epithelialization had begun. A distinct tongue of epithelium could be seen growing toward the center of the ulcer from the upper left margin. The granulation tissue appeared much healthier and was distinctly red in color. This is especially remarkable in view of the fact that all previous treatment—fulguration with the electric cautery, applications of silver nitrate, douches, etc.—had been without any effect.

In view of the history, clinical course of the disease, negative diagnostic tests, and especially in view of the result of the therapeutic test, the writer feels that he is justified in regarding this lesion as a syphilitic one of low grade virulence.

20 WEST FIFTIETH STREET.

REPORT OF CASE OF ANENCEPHALY—DIAGNOSIS BEFORE ONSET OF LABOR

BY ALEXANDER M. CAMPBELL, M.D., F.A.C.S., AND PAUL W. WILLITS, M.D., GRAND RAPIDS, MICHIGAN

THE following report of an anencephalic monster in which the diagnosis was made of the condition before the onset of labor, is presented, not because of the pathology, but because it demonstrates the value of roentgenography in obstetrical diagnosis. The proper emphasis has not been given to the use of the x-ray in the obstetrical field. With the improved technic and apparatus at the present time the x-ray examination of the gravid woman, and especially the primipara, should become a part of a good obstetrical service.

Mrs. H., age twenty-four, primipara, presented herself for examination on July 8, 1922. Her condition throughout the pregnancy had been normal and she had not felt it necessary to consult a physician. She had been married for two and one-half years, but had never been pregnant. She had a dilatation and curettage twice, partly on account of sterility and partly because of dysmenorrhea.

Family history, negative; personal history, negative except for typhoid fever at 8 years of age; blood Wassermann, negative. Last menses occurred November 12, 1921. Life was felt at about four and one-half months and the probable date of confinement was set for August 19, 1922.

General physical examination.—Patient was an athletic type of woman apparently eight months pregnant. The abdomen was rather firm although not overly large. Pelvic measurements: Intersp. 24; Interer. 27; Intertroch. 30; External Conj.

21; Internal conj. was not determined as the patient appeared to have normal measurements, and was in her eighth month. Blood pressure: systolic 110, diastolic 70; weight 121, urine negative.

She was examined carefully every two weeks from the date of her first consultation. She increased normally in weight, her blood pressure remained normal, and the urine was negative throughout. She failed to go into labor on the expected time, but the possibility of a mistaken date was considered and no alarm was felt.

On September 5th, 17 days after estimated time of confinement rectal examination showed a partially effaced cervix, but no pains had been felt. After a careful aseptic preparation she was examined vaginally. The cervix was found to be partly effaced and she was dilated sufficiently to introduce a finger into the cervix. A soft mass was felt at the end of the examining finger with rather a hard oval rim about a softer center. An abdominal examination showed the ovoid to be longitudinal. Fetal heart tones were good on the right side below the level of the umbilicus. Small parts were to the left and well up, and what was thought to be the buttocks palpated in the upper right quadrant. The probability of a monstrosity was strongly suspected, and the patient taken to the hospital for an x-ray examination. This showed a fetal skeleton with the small parts in the upper half of the uterus, and with the vertebral column and ribs well down in the pelvis. Hydrocephalus and the presence of a normal head were excluded, and a positive diagnosis of anencephalus was made.

The patient was advised to have the pregnancy terminated at once. After 24 hours this advice was accepted, and a Vorhees bag was inserted under anesthesia at 10:15 A.M. Patient was returned to her bed and slight traction, 2 pounds, made on the bag. The patient was given morphine gr. $\frac{1}{4}$ at 10:15, and again at 12:15, and felt very little pain at any time during the procedure. The bag was expelled at 1:25 P.M. and a version and extraction performed at once. A living anencephalic monster was delivered. No attempt was made at resuscitation but the child lived for about four hours. There was a hydramniotic condition present. Convalescence was uneventful.

J. T. Case of Battle Creek was the first to report a roentgenographic diagnosis of an anencephalic monster, in 1917, and as far as we have been able to ascertain ours is the second case that has been reported in medical literature. It is our opinion that roentgenography, especially where any abnormality is suspected, will become a common procedure in obstetrical diagnosis.

Credit for the diagnosis in this case should be given largely to Dr. Thomas O. Menees, roentgenologist, Blodgett Memorial Hospital.

REFERENCE

(1) *Case, James T.*: Surg. Gynec. and Obst., March, 1917.

METZ BUILDING.

REPORT OF A CASE OF ADENOCARCINOMA OF THE BODY OF THE UTERUS

BY J. S. HORSLEY, JR., M.D., RICHMOND, VA.

(From the Surgical Department of St. Elizabeth's Hospital.)

THE following is a report of an early case of adenocarcinoma of the body of the uterus which probably developed on an hypertrophic endometritis, and which was apparently cured by curetting and radium application.

Mrs. F. V. S., white, aged 47, housewife, complained of "bleeding from the

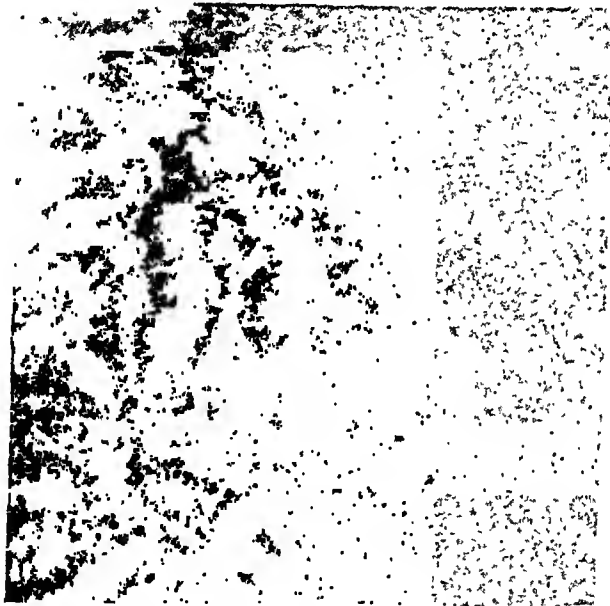


Fig. 1.—Photomicrograph of adenocarcinoma of body of uterus, showing a low degree of malignancy, Grade I (according to Mahle's grading). $\times 200$ (approx.).

womb." She had seven children, living and well, and one dead, cause unknown. Past history was negative, except for influenza in 1918 and long standing constipation. Since the birth of her last child, fifteen years ago, she had had a slight protrusion of the bladder for which she had worn a pessary for twelve years. This condition had become worse. When the bladder was full, the protrusion was about the size of a "hen's egg." It subsided after urination. For the past twelve years she had had a tired, dragging sensation in the small of her back after exercise. There was no pain on defecation.

The patient's last menstrual period was five years ago. Since then she has had a moderate whitish vaginal discharge. Three weeks ago, she had noticed a slight burning sensation in the left side of the abdomen. This was soon followed by bleeding (about a tablespoonful) from the vagina. She subsequently bled small amounts on two successive days.

The patient was a very obese woman with bad teeth, numerous varicosities of

the right ankle and both thighs, blood pressure 180/90. The abdomen was slightly tender on deep palpation over the umbilicus and lower part. Pelvic examination showed marked cystocele and rectocele, markedly enlarged and congested cervix. Physical examination was otherwise essentially negative.

The patient refused to have a hysterectomy, and on July 27, 1920, dilatation and curettage were done, the cervix was amputated, and the cystocele and rectocele were repaired. The uterine scrapings showed hypertrophic endometritis with no evidence of malignancy. The patient left the hospital after twenty-three days of normal convalescence.

Further slight vaginal bleeding caused her to return, and on October 29, 1920, she was again dilated and curetted. Uterine scrapings showed both on immediate frozen section and on celloidin block a hypertrophic endometritis. On February 14, 1921 dilatation and curettage were done again for further bleeding. The uterine scrapings appeared somewhat unusual and showed a low grade adenocarcinoma (cor-

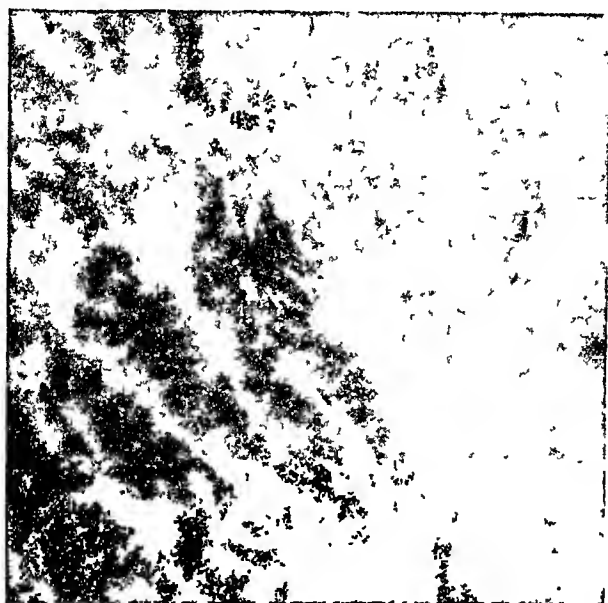


Fig. 2.—Photomicrograph of adenocarcinoma of body of uterus of same area as Fig. 1. $\times 500$ (approx.).

responding to Grade I. according to Mahle's differentiation of this type of malignancy) by microscopic examination (Figs. 1 and 2). Twenty-five milligrams of radium were inserted into the body of the uterus for twenty-four hours. Again on May 18, 1921, dilatation and curettage were performed, followed by the application of 57 milligrams of radium for twenty-four hours. Uterine scrapings were small in amount and not malignant, either grossly or by microscopic examination of frozen fresh and celloidin sections. On January 18, 1922, dilatation and curettage were done, and 50 milligrams of radium inserted into the uterus for twenty-four hours. The curetted material was again small in amount and showed no evidences of malignancy either grossly or microscopically. Soon after her last examination she left town, and has not been heard from since.

This case is unusual in that there apparently developed, rather suddenly, on a previously benign condition an adenocarcinoma of the body of the uterus, which seems to have been cured by dilatation and curettage operations, and the insertion of radium.

New Instruments

A VIRGIN BIVALVE SPECULUM (ADULT LENGTH)*

BY VICTOR COX PEDERSEN, A.M., M.D., NEW YORK

IN my clinic in urology at St. Mark's Hospital, there are a great many adult virgins who are supposed, or are known, to have had illicit sexual intercourse with the danger of venereal disease infection and the possibility of impregnation. Such patients are referred to me by courts, reclamation associations, churches, social agencies, individual workers and the like. It becomes essential to know

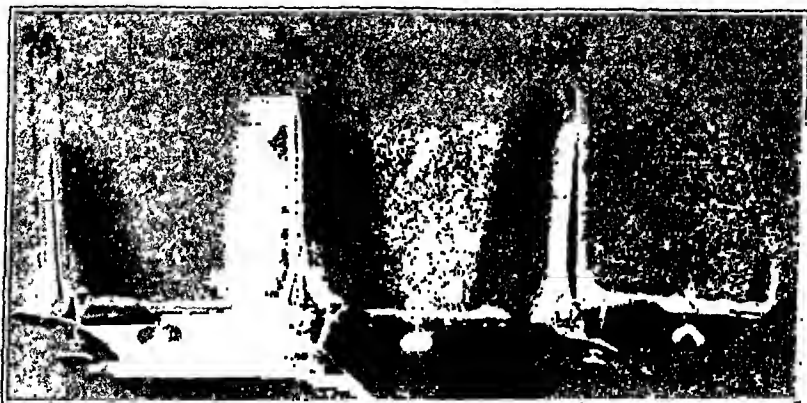


Fig. 1.—Shows the specula from the side with the identity of thickness of the two virgin instruments, which is less than one-half the thickness of the parous type.



Fig. 2.—Showing lengths of blades identical in the parous and the author's virgin type, but one inch longer than the standard virgin type; also indicating the widths of blades identical in the two virgin types, and a half inch narrower than the parous type.

whether or not these young women are infected, after the equally important detail of complete or incomplete intercourse has been settled.

It is worth while to repeat a few details regarding the taking of specimens for venereal disease, especially gonococcal and allied infections in women. A recent

*Presented before the Section on Obstetrics and Gynecology of the New York Academy of Medicine, December, 1922, and before the Annual Meeting of the American Electrotherapeutic Association, September, 1923.

experience is worth quoting. The report of a certain large clinic made the unusual announcement that only four per cent of the women applying, off the streets, for a venereal disease diagnosis were found to be infected. When I questioned the head of this clinic, and when he in turn interviewed the staff, it was found that only one smear slide was taken in a haphazard manner, not infrequently by a nurse and not by a physician. I then informed him that if he would institute the plan of taking at least four original specimens and four control specimens, in pairs, each pair from the urethra, vulva, vagina, and cervix, he would at least cover the usual sites of infection adequately. Furthermore, these specimens should be taken with considerable pressure or massage action on the mucosa in order to squeeze out the contents of glands which may carry infection. Slight contact of the swab on the surface of the secretion is by no means sufficient. This principle is well known among throat specialists in dealing with the tonsils. The only difference is that the crypts of the tonsils are recognizable to the naked eye, whereas the crypts of the mucosa in the sexual organs are usually not perceptible. Finally the varieties of organism found in the sexual passages and organs of the female are so great that only a culture will decide between the important or pathogenic, and the unimportant or nonpathogenic. On the basis of these tried and axiomatic principles, it becomes necessary to reach the culdesac of the vagina and the cervix in any woman presented for diagnosis.

After struggling for several years with the so-called standard virgin speculum I determined that a long instrument, with all the other dimensions about the same, was essential, and I, therefore, devised the speculum shown in Figs. 1 and 2, where it may be compared with the standard specula for virgins and parous women.

The advantages of the instrument are immediately apparent. There is but one limitation of simple character—namely, in some young women, especially if the bladder and rectum are full, the lateral walls of the vagina crowd into the opening of the instrument on account of its narrow blades as well as their own obstructing condition. In such instances, in order to reach the culdesac of the vagina and cervix, a small spatula or similar instrument is necessary to push back one lateral wall so that proper access may be obtained.

45 WEST NINTH STREET.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

THE APPLICATION OF X-RAYS TO OBSTETRICS AND GYNECOLOGY

BY RAMSAY SPILLMAN, M.D., NEW YORK CITY

THE recent general recognition that the x-ray is of value in the diagnosis of pregnancy, in the determination of presentation and of fetal abnormality, etc., has been accompanied by a lively interest in the possible effect of the x-ray on the fetus, in view of the general appreciation of the lethal effect of the rays on embryonic tissue. That the x-ray is reliable in obstetric diagnosis has been shown by Stein and Arens,¹ who, within a year of coming to recognize that the fetal skeleton is demonstrable, announced a series of more than 400 cases studied. They have not been able to demonstrate the fetal skeleton with regularity before the fifth month, but in the last trimester of pregnancy it is regularly seen.

However, when Bailey, a man of recognized standing in the fields of obstetrics and the gynecologic application of radium, takes a stand against the use of the x-ray in obstetric diagnosis,² it should give one pause before rushing into the new field. Other practitioners, discussing the paper of Bailey and Bagg, stated that their patients in various stages of pregnancy had undergone roentgenologic examinations of the urinary tract, etc., without any injury to the developing fetus. A tangible basis for great caution in the exposure of the pregnant woman to either the x-ray or radium is found in the work of Bagg,³ who injected pregnant rats with a saline solution containing relatively large doses of radium emanation and found that this treatment even late in pregnancy resulted in the birth of dead or blind young. Subsequent examination of the surviving young showed extensive defects in the central nervous system, of which the defect in the eye was but a reflection. In a personal communication, Edling, a Swedish roentgenologist who has examined more than 200 patients in the past six years in one clinic, states that the children of the women he examined at the beginning of the series have shown no abnormality. Imboden has stated to the writer that he regards a proper roentgenologic examination of the pregnant woman as entirely free from harm for the child, but he takes issue most emphatically with operators who subject such a patient to a dozen exposures.

Pneumoperitoneum does not figure extensively in American roent-

genologic literature of the year. Von Teubern⁴ reports on the examination of 93 patients by this means, with the following results:

I. Persistent abdominal pain of hitherto unexplained origin, 23 cases:

Peritoneal adhesions, 5 cases.

Small hard liver, hydrops of gall-bladder, 1 case.

Tumor-like shadows in right hypogastrium, 7 cases.

(All diagnosed as chronic adhesive perityphilitis and in the 5 patients operated on, diagnosis confirmed.)

Movable kidney, 2 cases.

No findings, 8 cases. Several of these patients had no more pain after the procedure and were discharged as cured.

II. Chronic icterus, gall-stone colic.

III. Gall-bladder and liver tumors.

IV. Abdominal tumors.

V. Hepatic lues, 5 cases.

VI. Liver abscess, 5 cases.

VII. Tuberculosis of the peritoneum, 2 cases.

VIII. Relaxation of the diaphragm, 2 cases.

A death after pneumoperitoneum has been reported by Joseph.⁵ The autopsy findings were not equivocal, but it is believed that the cause of the fatality was air embolus from the puncture of the iliac vein, which was displaced from its normal relations by a deformity of the vertebrae and sacrum.

Basic ideas on x-ray treatment are being revised. Until recently it has been believed that scattering of the radiation in the tissues produces a considerable diffusion of the margin of the cone of x-rays, and dosage has been estimated according to the isodosage curves of Dessauer and Vierheller. At the Congress of the German Roentgen Society⁶ in Munich in April, Holfelder created the most lively interest by his assertion that the scattering of the radiation at the periphery of the cone of rays is negligible. A commission was appointed to investigate the discrepancy between Holfelder's findings and those which he challenged.

It is coming to be the custom to measure x-rays in Angstrom units of wave length. This measurement is attained by the use of an x-ray spectroscope: a crystal is composed of molecules arranged in planes separated by distances of the order of the wave length of the x-rays. These planes reflect the x-rays and form an invisible spectrum, in which the different wave lengths are detected by the use of an ionization chamber. This is a box filled with a gas of which the electrical conductivity is increased by ionization of the gas by the x-ray of the particular wave length that is reflected by the crystal at a given angle to the long axis of the chamber. It was the feeling at the German congress that the lack of uniformity of results in x-ray treatment is due to a number of factors, of which one has been the lack of uniformity of x-ray itself. Küstner spoke at the congress of the need for a standard model of ionization chamber for the measurement of roentgen rays, simple enough to operate and inexpensive enough that every roentgen treatment can be standardized by a uniform instrument. When this is accomplished, one of the variables in the very

complex equation of roentgen treatment will be replaced by a constant, which will be a great aid in determining the variables that remain.

The biology of the effect of x-rays upon tumors is a problem that is receiving earnest attention. Schwarz⁷ calls attention to a new conception of facts that have long been known, namely, that normal benign growing tissue shows towards repeated x-radiation a uniform or increased sensitiveness, while malignant recurrent anaplastic blastomas exhibit a decreasing sensitiveness to the influence of x-radiation. This he believes is due to the irradiation killing off the more susceptible malignant cells, leaving as survivors the more resistant ones; successive treatments leaving only the most hardy cells, which bring about the patient's death. Hence the conception that radiation stimulates malignant growth. Yet this is not accepted generally as an indication that a patient should be subjected to a tremendous initial dose; the x-ray in treatment of cancer is still regarded by many as a palliative rather than a curative measure, and one should aim to ease the existence of the patient rather than to subject him to roentgen-sickness in a vain hope of killing the whole cancer at one sitting.

Opitz⁸ at the 1922 meeting of the German Gynecologic Society stated that Professor Kolle had furnished him with a mouse carcinoma which gave 100 per cent of takes in inoculations with a suspension of the cells or with bits of tissue. Irradiation of mice after the establishment of this tumor was followed by definite regression of the tumor in comparison with controls. However, *irradiation of the broth containing the inoculation-material with a dose ten times the treatment dose used for cancer of the human uterus did not diminish in the slightest the percentage of takes.* But when either the whole mouse, or the skin over the prospective site of inoculation, was irradiated within three days previous to the inoculation, the percentage of takes was much decreased. Therefore, cancer cells that die as the result of irradiation, do not die because of the lethal effect of the ray directly on the cell, but because the ray produces, as a catabolism product of the somatic cells, some substance that combines with the cancer cells and deteriorates them. My query would be: shall we look forward to seeing the tumor region screened from the rays and the rest of the body irradiated?

X-ray application appears to be firmly established as the treatment of election for selected cases of uterine fibroids, the principal contraindications being sloughing or frankly submucous myomas. Zacherl⁹ spoke on the results of irradiation of 266 cases of myoma in the women's clinic at Graz. Of the whole number, 245 patients remained under observation until treatment was considered completed. In 139 cases two or three treatments were given. In all cases the tumors were noticeably diminished, and in half the cases the tumors almost entirely disappeared. Among the latter were a number of cases of resumption of regular menstruation after a long period of amenorrhea. In this clinic the roentgen treatment of metropathy has been similarly successful.

Yet in the same journal we read that direct radiation of the fibroid in several cases was observed by Hofbauer¹⁰ to be of no effect, but by a conception that is, to say the least, daring, a radiation of the

hypophysis from each side with 30 per cent of the erythema dose was followed by complete regression of the tumors and the bleeding, without any manifestations of pituitary damage. So far he has not repeated the radiation, and states that if there were occasion to repeat it, that three months should elapse between treatments.

BIBLIOGRAPHY

- (1) *Stein and Arcus*, Jour. Am. Med. Assn., 1923, lxxxi, 4. (2) *Bailey and Bagg*, AMER. JOUR. OBST. AND GYNEC., 1923, v, 461. (3) *Bagg*, Amer. Jour. Anat., 1922, xxx, 133. (4) *von Teubern*, Fortschr. a. d. Geb. d. Röntgenstrahlen, 1923, xxx, 215. (5) *Joseph*, Berl. klin. Wchnschr., 1921, lvii, 1361; cited in Am. Jour. Roentgenol., 1923, x, 676. (6) Abstract of Proceedings of the Fourteenth Session of the German Roentgen Ray Society, Am. Jour. Roentgenol., 1923, x, 666. (7) *Schwarz*, Am. Jour. Roentgenol., 1923, x, 622. (8) *Opitz*, Verhandlungen der Deutschen Gesellschaft für Gynäkologie, in Archiv f. Gynäk., 1922, cxvii, 223. (9) *Zacherl*, *ibid.*, p. 255. (10) *Hofbauer*, *ibid.*, p. 230.

Selected Abstracts

Complications of Labor and Their Prevention

Anderson, J. W.: High Percentage of Abnormal Obstetric Cases in General Practice. The British Medical Journal, July 22, 1922, p. 126.

The author reports that within six months, out of 42 obstetric cases attended, 19 or 45.2 per cent presented some definite abnormality. Only one of these cases was seen in consultation with a midwife. About 60 per cent were primiparae. In 46.7 per cent there was definite evidence of toxemia. F. L. ADAIR

Kuhlmann: One Thousand Cases of Obstetrics as Seen by a Country Practitioner. The Journal-Lancet, 1923, xliii, 146.

The author reports one thousand confinements with a maternal mortality of 0.33 per cent. Forceps were used but four times in the series. Placenta previa occurred three times and eclampsia twice. One woman died of a ruptured uterus following the injection of one ampule of pituitrin in the first stage of labor. Another patient died two hours after the administration of chloroform for the removal of a retained placenta. Four patients developed breast abscess. The writer concludes that a clean conscience, patience and good judgment are the essentials of successful obstetric practice. H. W. SHUTTER.

Couch: Fashionable Midwifery. The Medical Journal of Australia, 1922, xi, 264.

The author denounces emphatically the routine use of version and extraction, or low forceps in all cases. He emphasizes the danger of unnecessary interference, and is a firm advocate of conservative obstetrics. The value of such procedure is well shown in the following group of cases. In 580 labors forceps were used on eight occasions. Of this group there were 14 persistent occipitoposterior presentations, and two face presentations. There were nine twins, eight cases of eclampsia, and 18 breech presentations. Only two cesarean sections were performed. There were no cases of sepsis and no deaths from any cause. In six years he observed only five cases of sepsis with one death, and 91 stillbirths, including 26 macerated fetuses in a total of 2500 cases. NORMAN F. MILLER.

Van Blomestein: Rectal Examination During Labor. *Nederlandsch Tijdschrift voor Geneeskunde*, 1923, i, 259.

The author believes that the morbidity and mortality of the parturient woman would be reduced quite considerably if rectal examination were practiced universally. In support of this view, he cites various statistics. In the Amsterdam women's clinic the death rate from puerperal sepsis over a period of ten years averaged 1.6 per cent. For the entire city the figures are slightly higher, the difference being not as great as one would expect. In the clinic at Utrecht, 29 per cent of the parturient women had temperature over 38°. These rather unfavorable conditions are attributed by van Blomestein to the fact that rectal examination is not in general use in Holland. He believes that vaginal examination is responsible both for the milder as well as the severer infections. In contrast, he presents figures from some of the German clinics. Typical of these are the figures from Chrobak's clinic in Vienna, reported by Bukura, which show among 2155 women delivered without examination, no mortality from puerperal sepsis. Of 8631 patients examined only in the clinic, and who were delivered spontaneously, 0.07 per cent died from infection, while of 1843 spontaneously delivered women who had been examined before entering the clinic, 0.43 per cent succumbed to puerperal sepsis.

R. E. WOBUS.

Fürst, W.: The Value of Rectal Examinations during Labor and Their Limitations Compared to the Usual Vaginal Examinations. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1923, lxxxv, 469.

The author quotes extensive statistics from various clinics indicating that the morbidity in labor cases conducted entirely by rectal and external examinations is considerably lower than in those where vaginal examinations are employed. Normal labors may be satisfactorily conducted without the latter, and even in pathologic labor, rectal examination may give almost as much information as the ordinary vaginal examination with two fingers. Where there is dystocia due to disproportion between head and birth canal, vaginal examination with the whole hand is required to determine the exact relationship and the possibility of spontaneous birth. All cases where bloody urine, edema of the cervix or a contraction ring rising to the umbilicus indicate serious danger to the mother definitely require a vaginal examination. All cases of hemorrhage during labor require vaginal investigation. Prolapse of the cord or of a small part can usually be diagnosed rectally, yet in case of doubt, and in fact in any case where the rectal findings are not clear, vaginal examination should be undertaken. Operative vaginal manipulation should always be preceded by a careful vaginal examination. Limitation of vaginal examination should be more strict under all conditions where careful asepsis cannot be maintained. Vaginal examination, douches, intercourse and tub baths should be avoided during the last eight weeks of pregnancy. Rectal examination should be avoided whenever there is a urethral gonorrhea. Such a case should be conducted entirely by external examination if this be at all possible; if not, then vaginal examination should be used. Any disease of the rectum forms also a contraindication to rectal examination.

MARGARET SCHULZE.

Labhardt, Alfred: On the Question of Rectal Examination in Obstetrics. *Schweizerische Medizinische Wochenschrift*, 1922, lii, 193.

This article includes the usual discussion of the dangers of repeated or even one vaginal examination. Approximately three thousand cases are reported which had either no examination, rectal examination, one vaginal, or two vaginal examinations.

The small percentage of febrile elevation of temperature when rectal examinations only were employed is at once apparent. He concludes that the rectal examination can be done with little or no manipulation, that it is less disturbing, that it carries less danger of infection, that it affords all the information necessary and that vaginal may only be necessary to check up the findings at rare intervals. To be successful, however, vaginal examinations must have been done first thoroughly to become acquainted with the anatomic conditions.

A. C. WILLIAMSON.

Kupferberg: Conduct of Labor Without Vaginal Examinations. *Medizinische Klinik*, 1922, xviii, 617.

It is a sad fact that during the past five years the number of cases of puerperal sepsis has doubled. This is due to many causes, among them, an increase in general septic diseases, uncleanness, increase in venereal disease and in abortions, especially criminal abortions, unindicated forceps operations and manual removal of the placenta. As an aid in the prevention of sepsis, it is advisable that the physician make a thorough examination of the patient two or three weeks before term. This should include measurements of the pelvis and abdominal and vaginal investigation.

During labor, of greatest importance is the employment of the four maneuvers of Leopold-Zweifel-Schultze. The first indicates the height of the uterus and the part occupying the fundus; the second determines the direction of the long axis of the child and the side on which the back lies; the third seeks for the part occupying the inlet; and the fourth maneuver determines the extent of engagement of the presenting part. Auscultation will inform the physician of any impending danger to the child. Frequent use of the third and fourth maneuvers will show the progress of descent of the presenting part. When a breech presentation is suspected, the discharge of meconium will strengthen the suspicion. Of importance in the conduct of labor are the character and position of the pains. In the first stage the pains begin in the middle of the abdomen or the back and gradually are felt lower and lower. When there is complete dilatation the pains are strongest over the symphysis and over the osceyx. In the period of expulsion the pains are of a bearing-down character. By means of all these observations the great majority of labors can be conducted accurately without danger to mother or child. Should an internal investigation be necessary, a rectal examination should be made.

Without vaginal examinations one may not only determine whether the child is alive or dead, its size, presentation and position, amount of liquor amnii, parietal presentation and multiparity, but also, with the aid of rectal examinations, one may recognize placenta previa, abruptio placenta, prolapse of the cord and tearing of vasa previa in cases of velamentous insertion of the cord. Postpartum, it is possible to diagnose an inversion of the uterus from external examination alone, and the differential diagnosis of postpartum hemorrhage can be made by the same means.

J. P. GREENHILL.

Wijsenbeek: Is Early Rupture of the Membrane Desirable? *Nederlandsch Tijdschrift voor Verlooskunde en Gynaecologie*, 1922, xxviii, 34.

After a systematic study of 4382 labors, 2643 of which were in primiparae and 1739 in multiparae, Wijsenbeek arrives at the following conclusions: In general, the time of rupture of the membranes has no effect upon the time required for dilatation of the cervix. In a given case it is impossible to say how the uterus will react to the loss of the amniotic fluid. When the membranes rupture early, more cases of retarded expulsion will occur. Forceps application will be necessary three times more often in cases of early rupture. Prolapse of the cord is not more

common in cases where the membranes persist until full dilatation is accomplished. In early rupture of the membranes, fever during labor is much more frequent. Early rupture of the membranes is not a contributing cause of deep cervical tears. In dry labors, both fetal and maternal mortality is higher. R. E. WOBUS.

Willmore: *Clinical Observation on Adhesion and Retention of the Membranes.* Indian Medical Gazette, 1922, lvii, 210.

The author discusses 96 labor cases, personally attended, in which this complication has been found. Retention of the placenta occurred once, whereas definite trouble with the membranes occurred in twenty of the cases.

The first notable fact observed was the markedly varied course taken by these cases. It seems possible that reported deaths from sepsis following labor, where there has been no interference, are due to unrecognized cases of this complication. The involution of the uterus appears to be much less influenced by the retention of membrane. A third feature is the frequency of hemorrhage. Adhesion of the membranes is by far the most frequent cause of postpartum hemorrhage. Its occurrence early in the third stage points to trouble with the membranes. Finally, apart from the pyrexia, the relatively mild effect on the patient, a slight degree of headache was constant.

As prophylaxis, the third stage should not be hastened or interfered with. If after delivery of the placenta some of the membranes are retained, the case should be left to nature. On appearance of reaction, intrauterine douches are given daily, preceded by a vaginal douche. The aim of the douche is not one of disinfection, but is purely the mechanical one of cleansing the uterus from discharge and washing away loosened membrane. F. J. SOUBA.

Vermelin: *Dissociation of the Membranes.* Le Progrès Médical, June 11, 1921, p. 277.

In reviewing the literature Vermelin finds that as early as 1892, separate rupture of the amnion and chorion was described by Ribemont and Dessaignes, and later by Pinard and Varnier.

This dissociation may vary from only a slight separation around the area of rupture to that of complete separation. Dissociation occurs in those cases where seemingly labor is made safer for both the mother and the child by their separation. In the main, these pathologic conditions are low implantation of the placenta, retarded rupture of the membranes, adherent membranes and abortions.

In the case of low implantation of the placenta the chorion ruptures prematurely. The amnion then becomes separated and slides downward over the chorion with each uterine contraction. In this way pressure is diverted from the placenta which remains attached throughout to the uterine wall so that the hemorrhage which would follow its detachment is averted.

A similar occurrence takes place in cases of retarded rupture of the membranes so that the placenta remains in contact with the uterus, the fetal circulation continues unharmed and asphyxiation of the child is thus avoided.

In the case of adherent membranes a premature rupture must necessarily take place before cervical dilatation can be accomplished. Here again the chorion alone ruptures and the amnion, by virtue of its property of greater elasticity, serves both as a dilating wedge for the cervix and as a barrier to the entrance of infection into the uterus from below.

Finally, in abortion much hemorrhage is averted by a dissociation of the membranes because the fetus and amnion, the cord having become separated from its

placental attachment, may be expelled while the chorion and placenta remain attached throughout to the uterine wall.

The diagnosis of disassociation of the membranes may be made either when there has been an expulsion of a clear fluid, but subsequent vaginal examination reveals a contiguous sack of waters in front of the presenting part, or when a thin paper-like membrane may be seen presenting at the vulva. The importance of its recognition and diagnosis lies in the fact that it is one of the greatest etiologic factors in partial retention of the membranes. Vermelin reports twenty-three cases of retained membranes of which ten showed complete and thirteen showed partial disassociation of the amnion and chorion.

THEODORE W. ADAMS.

Zarate, Enrique: The Necessity of Uniformity in the Nomenclature of Uterine Dystocia. *Gynécologie et Obstétrique*, 1922, vi, 1.

The author concludes that the only dystocia which should actually be accepted as a pathologic condition leading to uterine dystocia is that of uterine stricture or "dystocie annulaire." Attention should be paid to the dystocia of Seanzoni or the uterine retraction or pseudoecontraction, to see if it presents especial characteristics. The chapter on uterine dystocia should be subjected to careful, detailed and impartial study. The young specialists should carefully study and work out this problem, because those who are older cannot as readily liberate their ideas from older teachings and traditions regarding uterine dystocia. F. L. ADAMS.

Lange-Nielsen: Clinical Observations on the Contraction Ring in the First Stage of Labor. *Acta Gynecologica Scandinavica*, 1922, i, 295.

A systematic attempt was made to feel the contraction ring in all patients during the first stage of labor and in 67 cases out of 1564, the ring was felt. Of these 60 were primiparae. There was a mechanical disproportion in 15 of these 67 women, and in 11 cases the ring rose higher during the second stage. In almost half of the cases, the ring rose as high as the umbilicus and in most of the remainder, it reached midway between the symphysis and the navel. The dilatation of the lower uterine segment was not very great and during the intervals between pains there was neither tenderness nor spontaneous pain. There was no constant relationship between the height of the ring and the amount of cervical dilatation, as Unterberger maintained. In most of the cases there were normal occiput presentations. Early rupture of the membranes was a very common occurrence in this series. In many cases the ring had no significance as the patients had easy spontaneous deliveries. In general, however, a rising contraction ring means that the first stage is not progressing normally and labor should be terminated if progress is slow. Even in the severe cases the signs were not those of threatened rupture of the uterus. The contraction ring appears to be a functional anomaly and among the possible causes may be mentioned early rupture of the membranes, slightly contracted pelvis, elderly primiparity and defects in the uterine musculature or its innervation.

J. P. GREENHILL.

Greenhill: Dystocia Due to Constriction of One Thigh by Cervix in a Cephalic Presentation. *Journal American Medical Association*, 1922, lxxviii, 98.

Greenhill reports a rather unique case. A female child was spontaneously delivered until the umbilicus presented at the vulva, when further delivery was impossible. It was found that the left leg was in the vagina, while the right was tightly clamped by the cervix. Even after complete surgical anesthesia, it was difficult to release the grasp of the cervix by inserting a finger. The baby showed

a deep constriction encircling the upper third of the thigh, below which the leg was very much enlarged due to blood stasis.

R. E. WOBUS.

Sachs, E.: *The Treatment of Weak Uterine Pains*. Medizinische Klinik, 1922, xviii, 1045.

In treating weak uterine pains it is essential to know the stage of labor, and whether the atony is primary or secondary. Among the causes of uterine atony are congenital weakness, overdistention, fever, premature use of twilight sleep, complications of labor and sudden emptying of the uterus. The danger of atony increases with the progress of labor. The most dangerous period is after the expulsion of the placenta, but fortunately there are means of overcoming this atony.

Uterine weakness during the first stage requires no special treatment. If secondary atony arises in the first stage, a large dose of morphine is indicated.

The older means of stimulating pains are mechanical; but they do not equal quinine, chineol or hypophyseal extract. In over 700 cases treated with pituitary preparations no bad result occurred. These preparations give better results in cases of secondary atony which usually require treatment in the second stage. In the third stage before the expulsion of the placenta, pituglandol in primiparae gave good results, but in multiparae failures occurred due to adherence of the placenta. After expulsion of the placenta, pituglandol gave perfect results. During the past 12 years, Sachs has not found it necessary to pack the uterus for atony because pituglandol, given intravenously, absolutely controls uterine atony.

Every forceps operation is made easier by giving pituglandol and low forceps operations are often entirely avoided. Likewise numerous complications may be successfully treated with this drug. In cases of atony, occurring postpartum and in cesarean section after delivery of the baby, pituglandol is given intravenously and secale into the uterine muscle. Sachs believes there is no danger to the normal child from the use of these drugs.

J. P. GREENHILL.

Buist, R. C.: *A Note on the Early Recognition and Corrective Treatment of Occipito-Posterior Presentations*. British Medical Journal, Nov. 12, 1921, p. 782.

The author emphasizes the importance of diagnosis by external palpation and argues for the correction by external manipulation. He secures correction of position by the use of a binder with pads so placed as to tend to correct the posterior position by pressure on the different parts of the fetus.

F. L. ADAIR.

Hamilton: *The Problem of Posterior Positions*. Journal Missouri State Medical Association, 1921, xviii, 305.

Hamilton thinks that posterior positions are in fact more frequent than formerly, and considers as the cause a modification of the female pelvis due to change in posture caused by high heels, to corsets, and to a general alteration in the mode of life of the modern woman.

His method of treating this condition is as follows: During the first stage, the patient is kept as comfortable as possible by means of morphine or twilight sleep. Should the membranes rupture prematurely, he introduces a large Voorhees bag. After the cervix is fully dilated, the patient is anesthetized with ether, the hand introduced, grasping the head or shoulders or both, and changing the position to an anterior. The head must be kept well flexed. The child is then pushed into the pelvis by pressure on the breech and delivered by forceps.

R. E. WOBUS.

Tweedy: The Treatment of Antepartum Hemorrhage. The Clinical Journal (London), 1921, 1, 5.

The author reports 72 cases of accidental hemorrhage in 18,000 deliveries with only two deaths from bleeding. He plugged thirty patients and insists that the vaginal plug, as used at the Rotunda Hospital, is efficient and does check hemorrhage by impeding the circulation of the uterine vessels. His contention has been strengthened by seeing the absence of pulsation in the uterine arteries, at cesarean section, when pressure was made from below on the lateral fornix. The operation does have some dangers, and will cause pain and may even bring about shock. Rupture of the membranes is not considered a contraindication. By such procedure the main blood supply is cut off and coagulation at the sinuses is promoted. He believes that hysterectomy has no place in accidental hemorrhage.

A. G. WILLIAMSON.

Strecker, J.: Disturbances in the Third Stage of Labor. Monatschrift für Geburtshilfe und Gynäkologie, 1923, lxii, 283.

During the last few years of the war, it was observed that the number of postpartum hemorrhages increased markedly, and also that many women succumbed to relatively small losses of blood. Unlike eclampsia which has returned to its pre-war figure, the number of postpartum hemorrhages has remained as high as it was during the war. As "disturbances" the author considers first, retention of the placenta for 2 to 5 hours without bleeding; secondly, slow hemorrhage with retention of the placenta which requires manual removal; and thirdly, incomplete expulsion of the placenta. The last caused the greatest trouble.

In treating these patients it was found that there were fewer febrile reactions when retained portions of the placenta were removed than when the patients were treated expectantly. Many of the latter patients continued to bleed. He frequently used the method of injecting a solution into the umbilical vein to hasten separation of the placenta, but advises against its use where there is much hemorrhage. Manual removal of the placenta in cases of hemorrhage is preferable to other uncertain methods.

J. P. GREENHILL.

Seides: Pituitrin in the Third Stage of Labor. Surgery, Gynecology and Obstetrics, 1923, xxxvi, 108.

Seides administered 0.5 c.c. of pituitrin at the beginning of the third stage of labor in 500 consecutive cases. He is convinced that the results are such as to warrant its use as a routine, and maintains that it not only shortens the third stage, but makes such manipulations as Credé's maneuvers altogether superfluous. He claims to have noticed a definite diminution of the amount of blood lost postpartum, and that even the lochia were diminished to such an extent that he was able to get his patients out of bed earlier than usual. He believes that a single dose of pituitrin thus administered facilitates involution of the uterus. In no case did the pituitrin cause retention of the placenta.

R. E. WOBUS.

Abelheim: Postpartum Hemorrhage. The Medical Journal of South Africa, 1923, xviii, 167.

Patience to sit by and allow the placenta to separate normally is the greatest single factor in the prevention of postpartum hemorrhage. The uterus should not be kneaded and pressed upon before placental separation is complete. Credé's expression is only justified after the placenta has separated.

In the presence of severe hemorrhage with the placenta still *in situ* the author

stimulates the uterus to contract and then attempts expression by Credé's method. Failing, the following steps are carried out in this order: catheterization, injection of ergot, massage of the uterus, compression of the aorta, hot antiseptic douche and the injection of the placenta (through the vein in the cord) with hot sterile water. If further attempts fail and hemorrhage continues, remove the placenta manually. If bleeding continues after this expression or removal of the placenta, and there is doubt as to its having come away completely, explore the cavity of the uterus.

For hemorrhage occurring after the placenta has been delivered the simplest method of treatment is compression of the aorta with the fist or a flexible tube about the waist. If anemia is severe bind the lower limbs before applying the tube or belt. Salt solution should be given per rectum. For bleeding from an atonic uterus the author carries the fundus forward, compressing it against the symphysis. A big pad held in place by a tight binder may then be used to keep the fundus forward. Where deep cervical tears cause serious hemorrhage the author has found suture difficult and unsatisfactory. In these cases much time may be saved and the hemorrhage controlled by pressing one fist upward against the vulva and carrying the other downward back of the uterus. Compression of the structures lying between results, and thrombosis occurs in from 20 to 30 minutes. A definite routine in the treatment of postpartum hemorrhage improves the results, robs the condition of much of its terror, and inspires confidence in the apprehensive patient.

H. W. SHUTTER.

Zangemeister: Retention of Placental Rests at Full Term Delivery. *Muenchener Medizinische Wochenschrift*, 1921, lxviii, 388.

Teaching literature fails to stress the difficulty of diagnosing this condition and consequently treatment has become too conservative. There is, in many cases, no absolute proof regarding the completeness or incompleteness of the placenta immediately following delivery.

From his series of 4837 deliveries (divided between "conservative and radical" treatment) the author concludes that the latter method, i.e., immediate emptying of the uterus with definitely incomplete placenta, and immediate exploration (and where necessary emptying) of the uterus with completeness of placenta in doubt, does not possess any added danger unless the uterus is already infected. On the other hand, placental rests were overlooked at delivery eight times in the 3665 deliveries of the "conservative" series, and none has been overlooked in the 1772 deliveries of the "radical" series. The technic of the operation includes use of vaginal speculum, tenaculum in cervix and careful application of abortion forceps to pick out the placental rests.

S. B. SOLHAUG.

Muret: Concerning Postpartum Obstetrical Shock. *Schweizerische Medizinische Wochenschrift* (Basle), 1923, liii, 14.

Many observers have noted and commented on the symptoms of collapse with little or no bleeding following delivery. Marieceau and Leroux, as early as 1776, called attention to it as a syncope following delivery and not dependent on blood loss. In 1907 Wallieh of Paris gave the syndrome the name of "obstetrical shock." A case of a ii para is reported. Pregnancy had been uneventful except that the patient was decidedly of nervous temperament. After an ordinary labor a baby weighing 3600 grams was born. The delivery was spontaneous and no anesthetic or narcotic was employed. The placenta was expelled easily about fifteen minutes after delivery of the child and because the membranes were torn and there was a little bleeding a low vaginal douche was given and the fragments came away. In-

spection of the perineum and cervix showed no tears and the uterus seemed to be acting well. Little by little the pulse began to rise and the patient complained of feeling faint, palsy of the left jaw, peculiar sensations in the hand and of seeing double. The feet were elevated, heat applied, warm wine administered, and camphor and oil with strychnia given subcutaneously. At intervals for the next four hours these symptoms plus ringing in the ears persisted despite the fact that the uterus remained well contracted. The pulse was small, hard to count and at times imperceptible. A consultant felt that she would die, but about twelve hours afterward the patient was quite herself except that she complained of being very tired as though her limbs were bruised from beating.

The causes are obscure. The condition might be compared with the shock following an accident in which no visible injury can be demonstrated, hence purely a nervous phenomenon as, for example in the case of a woman who after delivery went into shock when she heard the physician say that he must repair the perineum. The toxemic theory could be dismissed, because nothing in the way of a toxemia could be demonstrated, and her labor was not sufficient to consider it one of fatigue. The part that the endocrine system might play is still a question. The fact remains that there is a definite entity which might be called obstetrical shock occurring with no particular reason or warning and with no demonstrable hemorrhage. The treatment must be adapted to the individual case, and consists chiefly in stimulation. In some cases all remedies fail and death is sudden. A. C. WILLIAMSON.

Van der Perk: *Acute Dilatation of the Stomach after Labor.* *Nederlandsch Tijdschrift voor Geneeskunde*, 1923, i, 454.

While acute dilatation of the stomach after operations is quite well known, it is not so universally known that this condition occurs occasionally after labor. Van der Perk reports the case of a primigravida who had gone through a 30 hour labor, 6 hours of which was consumed by the second stage on account of a rigid perineum. An hour before delivery she was given 1 c.c. pituitrin and delivery was aided by manual pressure on the abdomen. The placenta was expelled by Credé's method 30 minutes postpartum, after which the uterus contracted well.

Six hours after delivery the patient felt miserable and began vomiting. Her face was pale and drawn, the pulse was 100 but very weak, breathing superficial and rapid. The abdomen was ballooned, most prominent around the umbilicus. The stomach could be outlined. The uterus was well contracted.

The patient was placed on the right side; some time later eructations gave partial relief. Later on she expelled flatus and eight hours later she was quite comfortable.

It is notable that the sole treatment consisted in placing the patient on her right side (some authors have recommended left side position). Gastric lavage was not resorted to. R. E. WOBUS.

Weinzierl, E.: *Torsion of the Uterus During Labor.* *Monatsschrift für Geburtshilfe und Gynäkologie*, 1922, lix, 29.

The author reports two cases of torsion of the uterus during labor. In the first, there was a dextro rotation of 200°, whereas in the second there was more than 90° rotation to the left. In both patients the condition was not suspected and was found accidentally at cesarean sections which were performed in the interest of the babies. In both cases a moderate amount of fluid was found in the abdominal cavity but no evidence of an old inflammatory condition. Marked hyperemia was present in both, but this cleared up readily after reposition of the uterus. In one case the point of rotation was low down in the cervix so that the bladder partici-

pated in the rotation. In the second, the point of rotation was at the upper limit of the cervix, just over the baby's neck. Both operations were so bloody that it was impossible to tell whether or not there had been a previous premature separation of the placenta, with intrauterine bleeding. It is interesting to note that there had been no subjective or objective symptoms to indicate any pathology. In both patients the torsion undoubtedly developed during labor, but the exact etiology is obscure.

J. P. GREENHILL.

Fleurent, H.: Consideration of Some Cases of Rupture of the Uterus. *Gynécologie et Obstétrique*, 1921, iv, 544.

The author reports five cases of uterine rupture which have come under his personal observation. Case I.—Traumatic rupture of the uterus from a crushing injury of the lower abdomen. Case II.—Spontaneous rupture during labor. Case III.—Consultation. Rupture following version; patient had a contracted pelvis. Case IV.—Consultation. Slightly contracted pelvis; rupture following attempt at forceps on a floating head followed by extraction; intestines prolapsed through uterine rupture. Case V.—Several applications of forceps. Attempt at manual removal of placenta; intestines also prolapsed through uterine injury. The author believes in immediate laparotomy for uterine rupture whether it is complete or not.

F. L. ADAM.

Dorland: Report of a Case of Ruptured Uterus Resulting from the Use of Pituitary Extract. *Journal American Medical Association*, 1922, lxxviii, 191.

An octiparous woman had been in labor about twelve hours when she was given 8 minims pituitary extract (P.D. & Co.). This was repeated in an hour. Ten minutes after the second dose, the patient had a severe contraction followed by pain and signs of shock. The cervix was fully dilated. On abdominal section, a rent was found in the uterus throughout the attachment of the left broad ligament reaching almost to the fundus. The child, weighing 11 pounds, was dead. The abdomen was filled with bloody fluid, the placenta lying loose in the abdominal cavity and the uterus was firmly contracted.

Supravaginal hysterectomy was done and the patient rallied well under appropriate treatment, but died 48 hours after operation from exhaustion. R. E. WOBUS.

Keller, Raymond: Difficulties in the Diagnosis of Rupture of the Uterus. *Gynécologie et Obstétrique*, 1921, iii, 112.

In rupture of the uterus the classical signs, tearing pain, followed by rapid feeble pulse, pallor and syncope are not always present.

Keller outlines eleven cases. In these cases, the approximate time when diagnosis was made was as follows: 3 during delivery by clinical observation; 4 during manual extraction of the placenta; 1 at operation for fetus free in abdominal cavity; 1 four days after delivery; and 2 at autopsy.

Two premonitory signs are of value; mounting of Bandl's ring to the level of or above the umbilicus, and palpable tension of one or both round ligaments.

After rupture, the diagnostic signs were variable, and it was exceptional to obtain signs that left no doubt regarding the diagnosis. Signs sufficient to make a diagnosis are: the presence of a soft mass above the pubis that was not there before and which enlarges under the eye, and small parts of the fetus directly under the abdominal wall. Diagnosis of rupture can be made with certainty only when one can feel the rent in the uterus or the fetal parts directly under the abdominal wall.

R. T. LAVAKE.

Manton: Report of Two Cases of Acute Inversion of the Uterus. New York Medical Journal, 1921, cxiv, 397.

The author reports two cases of acute inversion of the uterus, one occurring in the third stage of labor in a multipara, probably the result of slight traction on the cord, the other occurring spontaneously on the tenth day in a primipara. Both of these cases showed no shock and made uneventful recoveries following easy manual reposition of the uterus under ether anesthesia. In the second case the uterus had been inverted for two days before the patient came under the author's observation.

Etiologic factors in this condition are traction on the cord, precipitate labor, delivery in the upright position and a short cord. Strong pressure from above in attempts at rapid delivery of the placenta may produce a similar effect, or even sudden strong contractions of the abdominal muscles acting upon a relaxed uterus. The author believes that the complication occurs more frequently in private practice than in the large maternity hospitals, and is largely the result of unskilled midwifery. The mortality is high, ranging up to 40 per cent. Death occurs from shock, hemorrhage (acute anemia) and sepsis.

The diagnosis of complete inversion presents no difficulties, but the partial type requires careful examination with this possibility in mind to determine the cause of a shock or hemorrhage.

The treatment should be prophylactic. Unjustifiable violence in the third stage should be avoided. When the condition actually occurs, shock and hemorrhage should be combated before an attempt at reinversion is made. When the placenta is still adherent, as it is in a considerable number of cases, it should be peeled off the uterus as quickly and thoroughly as possible without injury. Reduction may be accomplished by the aid of a small Voorhees bag, by packing, or by pressure with the coned finger tips. Following reinversion, the hand should be left inside the cavity until uterine contractions can be established, when it may be slowly withdrawn. The uterus should then be washed out with a hot, weak, antiseptic solution, and if there is a tendency to relax, both uterus and vagina should be packed with sterile gauze.

MARGARET SCHULZE.

Faust: Inversion of the Uterus. Journal of the Kansas Medical Society, 1921, xxi, 317.

Most cases occur in private practice, sometimes due to errors and sometimes occurring spontaneously up to the fifteenth day after delivery. The inversion may be partial or complete. It is most common in primiparae and is due to paralysis of the placental site, too vigorous compression of the fundus, or traction on the cord. It may also occur by contraction of the fundus with relaxation of the lower uterine segment, and from atony of the uterus. Any of these conditions may be augmented by intraabdominal pressure. Symptoms are pain, hemorrhage, and shock. Mortality is as high as 50 per cent. Prognosis depends on prompt treatment which consists in replacing the uterus in its natural position. Two cases are reported.

W. K. FOSTER.

Philips: Prolapse of the Spontaneously Inverted Puerperal Uterus. Nederlandsch Tijdschrift voor Gyneceskunde, 1922, i, 2058.

Philips reports the following case: A married woman aged 31 years entered the hospital during the latter part of her third pregnancy. Five years ago she had her first child. The labor was normal except that the placenta had to be removed manually, the method of Credé having proved ineffective. Fifteen months after-

ward she was again delivered. The placenta was expressed by Credé's method, carrying with it the inverted uterus to which it was still adherent. It was removed and thirteen days later she was taken to the hospital, where the uterus was replaced. Her recovery was rapid.

This time she again passed through a normal labor, but the placenta did not appear. All manipulation was avoided. There had been no traction on the cord, which was of ample length. The blood loss was scant. Twenty minutes after delivery, Philips noticed a funnel shaped depression in the fundus. Ten minutes later, the bleeding became so profuse as to cause acute anemia. It was then decided to remove the placenta, which lay in the vagina. However, it was found that the uterus had already become inverted and that the placenta was still firmly adherent. The inversion, which became complete during this maneuver, caused considerable shock. Under ether the uterus was replaced. Except for a foul vaginal discharge, the convalescence was normal.

Philips takes up the question whether, under such conditions, it were not advisable to perform sterilization.

R. E. WOBUS.

The American Journal of Obstetrics and Gynecology

VOL. VII

ST. LOUIS, FEBRUARY, 1924

No. 2

Original Communications

BLOOD SEDIMENTATION TEST AS AN AID IN DIAGNOSIS IN SURGICAL INFECTIONS

BY BERNHARD FRIEDLAENDER, M.D., DETROIT, MICH.

THE sedimentation time of the human red blood corpuscles is a nonspecific biologic reaction indicating the suspension stability of the erythrocytes in blood which has been rendered noncoagulable. The sedimentation test consists in observing the varying speed with which the erythrocytes, in a specially constructed tube, are separated from the plasma. It is of great importance to note whether there can be established a definite correlation between pathologic conditions and the length of time required for the sedimentation of the red corpuscles.

Historical.—Galen speaks of the erythrocytes as forming a buffy coat, or *crusta phlogista*, and the humoral theorists attempted to explain this phenomenon which takes place during gestation and inflammation. Both they and many later investigators expressed the belief that this condition was a consequence of some abnormality in the red blood corpuscles. Not until 1797, however, did the variation in speed of sedimentation of the erythrocytes receive any attention. Then J. H. Hunter not only observed that the erythrocytes during an inflammatory process settled more quickly in their own plasma, but he was also the first investigator to demonstrate that the red corpuscles of normal blood, when separated and transferred to the plasma of infected blood, settle with a greater speed, the rapidity of this process being in direct relation to the severity of the infection.

Johannes Müller, John Davy, and Herman Nasse continued the work of Hunter, and from 1830 to 1840 this problem was a very important one. For some time everyone wrote and lectured on it, but

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

later it was replaced by other problems and seemed to be entirely forgotten. Then J. Müller and C. G. Lehmann revived it, by showing that there is a variation in speed of sedimentation of the erythrocytes which they claimed depends upon the abnormal viscosity of the blood and the agglutination of the red blood cells in various infectious diseases. But the reason for this latter condition remained unexplained.

In 1917 Fahraeus took up the investigation of Nasse, Virchow, and Lehmann and made the very interesting observation that the erythrocytes in citrated blood settle with varying mobility. His attention was accidentally attracted to the rapidity of sedimentation of the red corpuscles in the citrated blood from gravid women. Later he, as well as Linzenmeier, found this phenomenon more marked in blood from patients who suffer from absorption of the products of infection. In this study Linzenmeier paid particular attention to acute pyosalpinx.

Etiology.—The etiology of the acceleration of the speed of sedimentation of the red blood cells is, as yet, somewhat obscure. Fahraeus and Linzenmeier are inclined to favor the idea that the increased agglutination properties of the erythrocytes in infections have an electrophysical basis. They claim that any interference with the electric current of the blood, either by a reduction of its potential, or by a loss of conductivity, will produce this condition. (Normally, erythrocytes have a negative, and plasma a positive, polarity). Plaut favors the idea of autoagglutination of the erythrocytes, while Sachs thinks that he can prove a change in the stability of the plasma.

The question to determine is why the plasma in some patients becomes clear in a very few minutes, while in others it takes many hours. As a specific example, a sedimentation test shows that a separation of the erythrocytes from the plasma, which normally takes about 1,000 minutes, occurs during pregnancy in 100 minutes or less. What is the cause of this marked difference in time?

Shall we conclude that the suspension stability of the blood depends upon the specific gravity of the erythrocytes or the viscosity of the plasma? That these factors, however, are not sufficient reason for this phenomenon can be shown by the fact that the erythrocytes of defibrinated blood require four to six times as long to settle as the red cells of citrated blood of the same person. We know that the defibrination of the blood does not change the physical character of the red blood cells or the viscosity of the plasma. It seems to me that a satisfactory explanation for the variation in the time of blood sedimentation is the autoagglutination theory of de Haan and Plaut, especially since we can notice in quickly sedimenting blood that the

erythrocytes take on a nummular (rouleau) formation and present a clumping.

But what is the reason for this increased agglutination property of the erythrocytes? It is not difficult to understand why the red blood cells clump together, if their viscous surfaces come into contact with one another. But it is hard to explain why there is no contact between the erythrocytes in normally circulating blood; for the red cells move in the normal blood stream at equal distances from each other, as a blood count shows a uniform distribution of from four million to five million red cells to a cubic millimeter of blood.

Fahraeus, Linzenmeier, and especially Hüber explain this as due to the electrical charge of the erythrocytes. Hüber used a specially constructed glass tube filled with diluted blood and attached both ends to electrodes. Microscopic observation then showed that the erythrocytes migrate towards the anode (-), which indicates that they have a negative electrical charge. The fact that they are similarly charged may be the reason that they repel each other to uniform distances. It has been shown that the red blood cells from healthy males move with greater speed towards the anode than those from the blood of gravid women, which would seem to show that the erythrocytes from gravid women have a reduced or impaired potential. The autoagglutination which results in the quick sedimentation of the erythrocytes can be attributed to this change in the electrical charge.

The bodies which cause the electrical discharge of the red blood cells are incorporated in the plasma. This can be proved by exchanging the erythrocytes and plasma from two specimens of blood, one of which sediments more quickly than the other. The results will be that the red blood cells from the more slowly sedimenting blood will settle more rapidly in the plasma of the other specimen, which indicates that the abnormal plasma has effected an electrical discharge from the transferred erythrocytes. Kurten believes that an abnormal proportion of cholestrin to lecithin in the blood is a sufficient reason for the disturbance of the suspension stability of the erythrocytes.

Surgical Application.—Linzenmeier's articles first directed my attention to the practical applicability of this simple test in surgery. I considered the following questions as a basis for the use of this reaction:

1. What is the simplest and most practicable technique?
2. What is the blood sedimentation time of normal blood?
3. Has the observed speed with which the red cells of infected blood settle a practical application in surgery, gynecology and obstetrics?

Technic.—There are two principal methods that can be used,—one worked out by Westergren and recommended by Fahraeus, and the other used by Linzenmeier.

The Westergren-Fahraeus Technic.—In a syringe, holding 0.4 c.c. of a 2.5 per cent sodium citrate solution, is drawn up blood from a vein to 2 c.c. After this is well mixed in a centrifuge glass, it is transferred to a 1 c.c. pipette up to the mark 20 cm. This pipette rests on a small rubber plate and is held by a spring in a horizontal position. After one hour the column of erythrocytes is marked at the separating line from the plasma, and is measured. A plasma column from 3 to 15 mm. in one hour is considered normal, 40 mm. is designated as +, 40 mm. to 70 mm. ++, 100 mm. +++, and above 100 mm. ++++.

The Linzenmeier Technic.—Here the necessary utensils are: (a) one c.c. hypodermatic syringe with 0.1 c.c. divisions. (b) sedimentation tubes of 6.5 cm. length and 5 mm. diameter, with a capacity of a little over 1 cc.* (Figs. 1 and 2.) Linzenmeier uses two marks only, the 1 c.c. mark and a mark 18 mm. below the 1 c.c. mark. We divide the space between the 1 c.c. and the 18 mm. marks still further into 6 mm. and 12 mm. and have added another at 24 mm. We designate the 6 mm., 18 mm., and 24 mm. points as I, II, III, IV respectively.

Following are the directions for the Linzenmeier technic:

1. The hypodermatic syringe must be perfectly dry or washed with a solution of sodium citrate.

2. Draw up 0.2 c.c. of the 5 per cent sodium citrate solution into the hypodermatic syringe.

3. Draw into the same syringe 0.8 c.c. of blood making the total contents of the syringe 1 c.c.

4. The sedimentation tube must also be perfectly dry.

5. Do not apply the tourniquet too long to the arm, or the blood will contain too much carbon dioxide or relatively too many blood cells, which will have a bearing on the time of sedimentation.

6. Mix the blood and the sodium citrate solution slowly in the syringe before transferring it to the tube, or mix it in the tube to prevent coagulation. The marginal level in the tube must be exactly at the 1 c.c. mark.

7. Note the time necessary for the blood cells to reach III (18 mm.). Marks I and II (6 mm. and 12 mm.) are for the purpose of computing the time, if the observer is in a hurry, but it is not advisable to use these readings. Mark IV (24 mm.) is used in case of a very rapid sedimentation of the erythrocytes.

8. Ordinary room temperature is satisfactory.

9. If the reading was neglected or uncertain, mix again and reobserve.

10. If the blood coagulates it must not be used. This occurs if the tubes are not perfectly dry or if they are washed in water containing lime salt.

This routine procedure which I have adopted in my investigations follows very closely that employed by Linzenmeier. I believe that the Westergren-Fahraeus method is not as accurate because it involves the use of long thin tubes that cause great error in the results because of capillary attraction and friction between the cells and the walls of the tubes. Perhaps these errors can be corrected, but at any rate I strongly urge the adoption of a uniform system in the use of the sedimentation test in order to facilitate the communication of results among medical men, and to avoid confusion in the reading of publications concerning the subject.

Normal Sedimentation Time.—The next point to be established as a basis for the test is the sedimentation time of normal blood.

In the evolution of every new method of diagnosis, conceptions of the normal must be acquired, and only after a sufficient number of

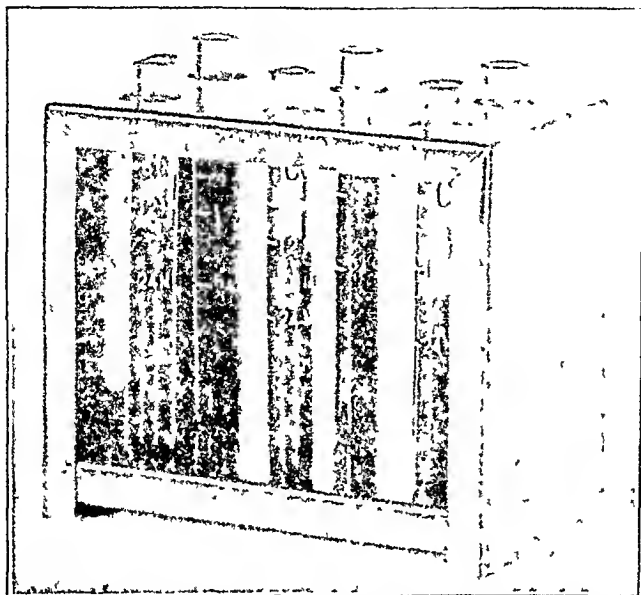


Fig. 1.—Tubes and stand, showing specimens in various stages of sedimentation.

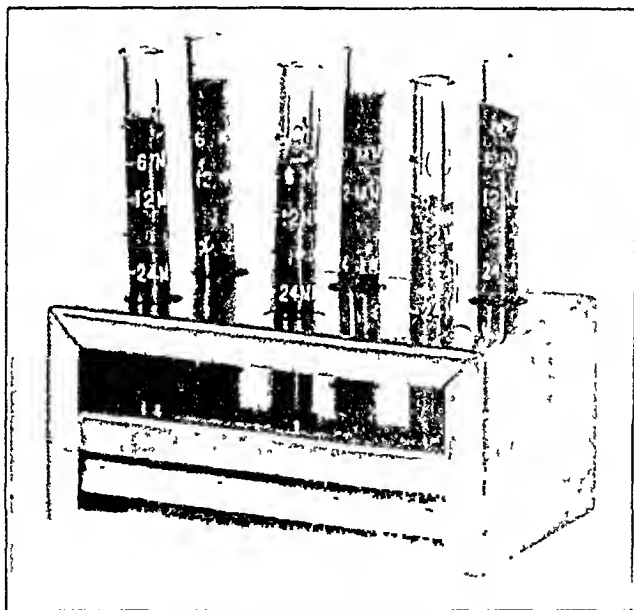


Fig. 2.—(Same as Fig. 1.)

examinations have been made can any inference regarding pathologic conditions be drawn. A long time must necessarily elapse and the results of many different investigators must be correlated before the full value of this method can be determined.

*The G. A. Ingram Co., 202 Bagley St., Detroit, Mich., supply these tubes.

I made the test on the basis of the time required for the sedimenting erythrocytes to reach the 18 mm. mark (mark III). In over 300 cases of healthy persons I found in the male a normal sedimentation time of from 1,000 to 1,200 minutes, in the female from 600 to 1,000 minutes. (These values are smaller than those given by Linzenmeier for his normal cases.) In my use of the term "healthy persons" I designate such men and women who felt subjectively well, in whom a strict physical examination could reveal no clue of an organic or functional disease, and whose history showed no possibility of an acute or chronic infection anywhere in the body.

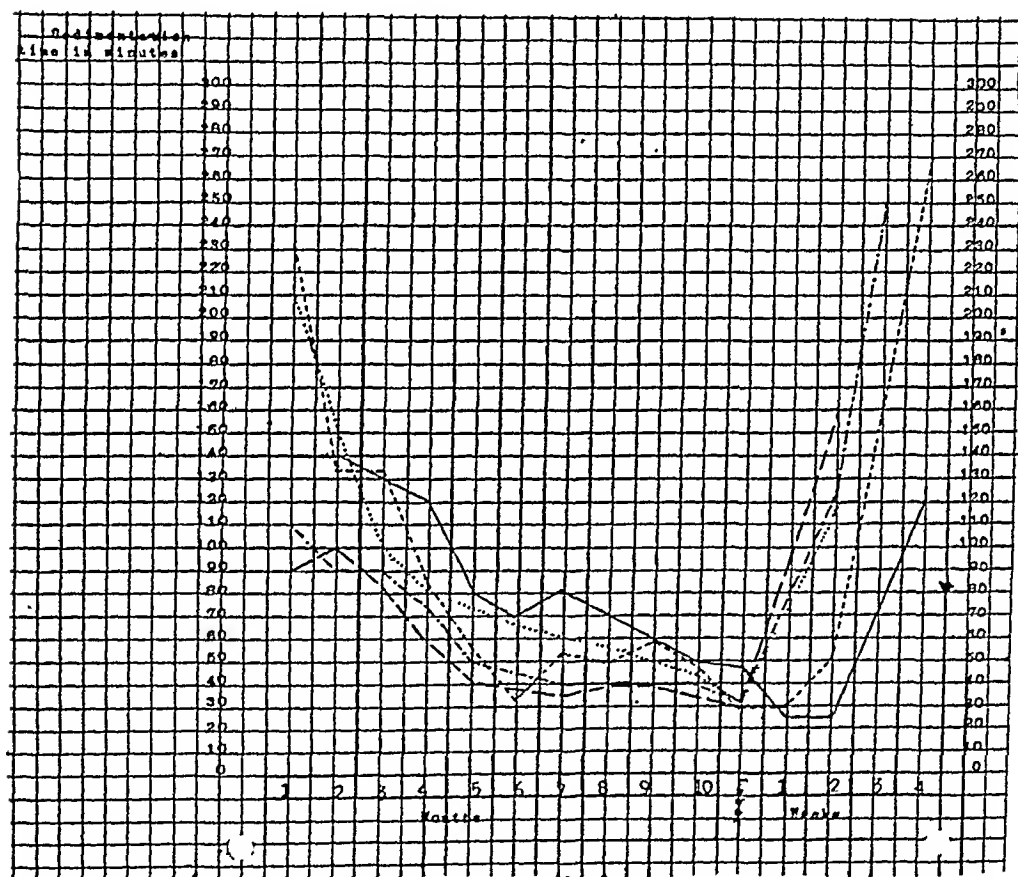


Fig. 3.—Five typical cases selected from 128 pregnancies from first month to fourth week after delivery.

Application in Surgery, Gynecology and Obstetrics.—The important question to be answered is whether the sedimentation test has a practical application. Its practicability as far as technique is concerned is obvious, for the test is simple and requires very little laboratory equipment. Then certainly the fact that in normal individuals the time required for the reaction is about 20 hours, while the same reaction takes place in a very few minutes in pregnant women, or in cases which present infections with an absorption of the products of the infection, indicates the value of the test. In spite of its non-

specificity it is a very valuable aid in the diagnosis of surgical infections, infectious diseases, and pregnancy.*

Certainly it is a more precise reagent than the thermometer. Every absorption of infected material is promptly recorded by a variation in the time of blood sedimentation even when the temperature remains normal. Like fever, however, the blood sedimentation reaction is general and not local. We can not always claim that a quicker sedimentation time than normal indicates an infection in that part of the body upon which we are directing our attention. We do know, however, that there is an infectious process in some part of the body,

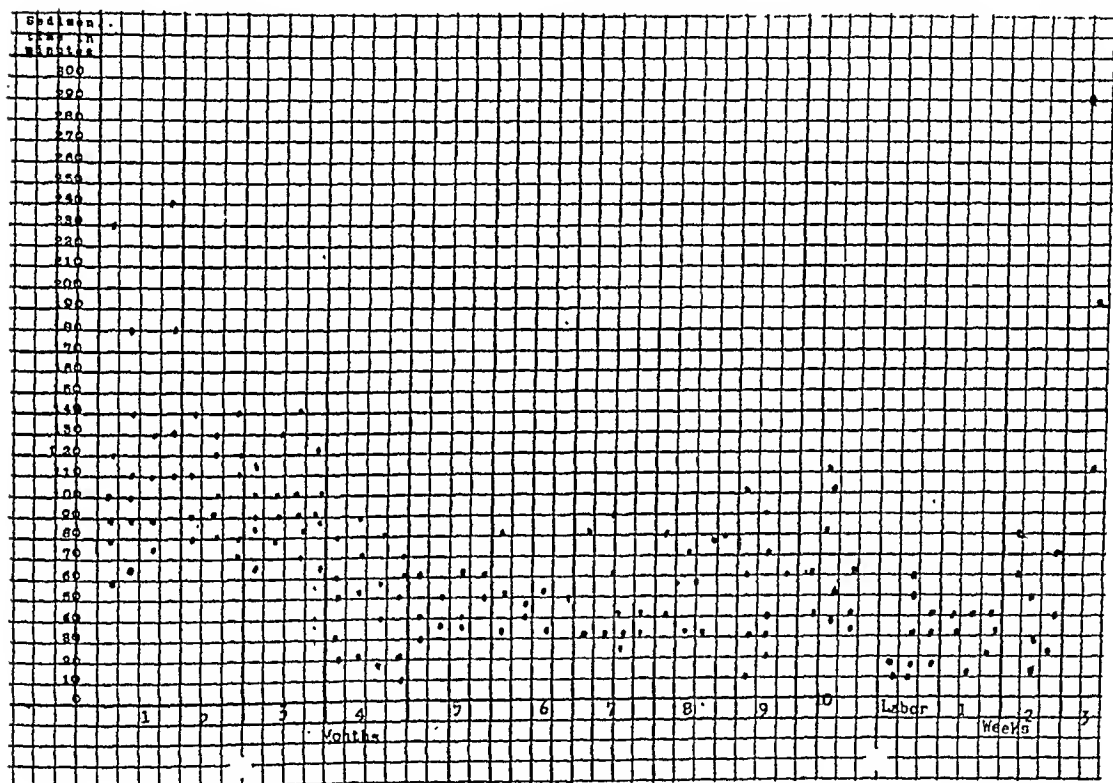


Fig. 4.—Each dot represents one case of pregnancy.

and that we must try to eliminate all error in our diagnosis. For example, when an infection was not found where it was suspected in certain of the cases, we were led by the results of the sedimentation test to seek it elsewhere. We have often found that an infection was not in the genital tract as suspected but, because of the rapid rate of blood sedimentation, we made a thorough search and found it in the gall-bladder or appendix. We are trying to classify the different surgical infections according to the sedimentation time, and similarly

*Plaut, Runge, and Büsche have adopted the test in nervous and mental diseases, and find that the sedimentation stability of the blood is disturbed in paralysis, tabes and cerebral syphilis. Katz and Graft have done considerable work in the application of the test in pulmonary tuberculosis, while Schürer and Elmer have distinguished themselves in research concerning the blood sedimentation in pulmonary tuberculosis and other infectious diseases.

to classify the stages of pregnancy from the first month to the end of the puerperium.

In the evaluation of the test, most of the cases were confined to adnexal diseases and pregnancies from the first month to four weeks postpartum.

Of 1500 cases in the clinic of Woman's Hospital, on which the sedimentation time was estimated, 480, or 32 per cent, were obstetric, and 1020, or 68 per cent were gynecologic. The average sedimentation time on these varied between 2.5 minutes and 720 minutes. A detailed list of these cases is too long for publication in this article; the lists below detail a few of the typical cases.

Linzenmeier established in his research that a sedimentation time of 120 minutes or less speaks for a pregnancy. He quotes cases, however, where the reaction time was more than 120 minutes and still the patient was pregnant. He concludes from this that we should be very careful in using this method for a positive diagnosis of pregnancy during the first three months which Fahraeus, however, claims to do. After the fourth month, when absorption takes place, the test is more reliable. I have seen cases of early pregnancy in which the sedimentation time was less than 30 minutes, and examination revealed an inflammatory condition in addition to the pregnancy. In the first days of the puerperium I still notice a quick sedimentation time, and from the tenth day on the time increases, returning to normal in about four weeks providing the healing process of the endometrium goes on normally without any infection. (Figs. 3 and 4.)

Ectopics and eclamptics show the same sedimentation time as ordinary pregnancies. Ruptured ectopics with fresh blood in the abdominal cavity have a quick sedimentation time, within the range of infected cases. However, the clinical symptoms will help one to make a differential diagnosis in such cases.

CASE 1.—Mrs. J. M., aged 23 years; menses normal before marriage. Soon after marriage she had signs and symptoms of gonorrhea; parametritis diagnosed in clinic. For six weeks she was very ill, but recovered, when she was examined and a diagnosis of retroversion made. She was anxious to become pregnant and a pneumoperitoneum was performed, when the left tube was opened. Two months later she missed a period. She was seized with severe pain in left lower quadrant. Mass felt in left culdesac. Sedimentation time, 94 minutes, about the same as for a normal pregnancy at this stage.

Diagnosis.—Unruptured ectopic pregnancy. Operation revealed a three weeks' tubal pregnancy.

CASE 2.—Mrs. R. M., aged 21 years, a para ii, was admitted to the hospital complaining of severe pain in left lower quadrant. Menses always painful and irregular. Married at seventeen, miscarried at four months, one year later. No pregnancies till four years later; missed period two months before admission. Felt perfectly well until day of admission, when she was suddenly seized with severe pain in left

lower quadrant after urination; fainted on the toilet. Complained afterwards of severe general abdominal pain, and pain in right shoulder. Taken to hospital. Sedimentation time, 17 minutes. Operated at once. A ruptured five weeks' tubal pregnancy was found. Sedimentation time during puerperium was normal.

CASE 3.—Mrs. C. I., aged 22 years, primipara. Vomited throughout pregnancy. Urine contained albumin and a few hyaline casts from time to time, and she was warned of the danger of eclampsia. Blood pressure averaged 140/75. Sedimentation time ranged from 120 minutes the second month to 55 minutes the eighth month. At seven and one-half months the patient had several eclamptic attacks, during which time the sedimentation time ranged from 40 to 60 minutes. Uterus evacuated, and patient had a normal puerperium during which the sedimentation time ranged from 30 to 240 minutes. The sedimentation time was the same throughout as in a normal pregnancy.

CASE 4.—This case illustrates the accuracy of the sedimentation time as a means of diagnosing the absorption of toxic products.

Mrs. N. C., aged 28 years, a primipara, felt well until one week before date of expected delivery. Suddenly she developed headaches, dizziness, palpitation of the heart, backache and icterus. Two days later she had five convulsions. When admitted to the hospital she was in a comatose condition. A dead child was delivered spontaneously. The patient had two convulsions after delivery, and died a few hours later. Sedimentation time just before death, 8 minutes. Postmortem examination showed acute yellow atrophy of the liver. Here is a case of eclampsia probably due entirely to intoxication from the liver condition, which filled the blood with foreign proteins, causing convulsions and death. (Compare with hemotoelastic crisis.)

Schürer and Eimer observed that in severe cases of uremia after phlebotomies the red blood cells sedimented very quickly without the addition of the sodium citrate solution. They observed the *crusta phlogistica* very clearly in these cases. In all genital inflammatory processes, especially infections of the uterine adnexa, we found a sedimentation time of from 2 to 30 minutes.

CASE 5.—Mrs. L. S., aged 34 years, complained of pains and weakness across small of back, headaches and relative sterility. She was constipated and had anorexia. Menstrual history negative. Marital history shows two children by first husband, none by second husband to whom she has been married three years. Examination shows large, soft cervix, retroverted uterus, marked pain in right fornix; left tube thickened as is also right. Temperature normal; sedimentation time 20 minutes.

Diagnosis.—Pyosalpinx. We are postponing operation until sedimentation time is above two hours.

The sedimentation test is especially valuable in those cases of adnexal diseases where there is a latent infection with a normal temperature and a normal blood count. Before using the sedimentation test, I often discovered during an operation a latent infection which was fired up and which jeopardized the life of the patient. All precautionary methods failed to eliminate this complicating element until I made use of the sedimentation test. Now I consider a rapid sedimentation time a sign of infection, and the operation is postponed until the test indicates a sterile field as far as operation is concerned. Whenever this procedure has been adopted, operations have not been complicated by the presence of an unsuspected latent infection, which

indicates that the test succeeds in showing the existence of such a condition. Because it is known that operation increases the morbidity and mortality in such infected cases, these directions indicate an exclusion of the possibility of a latent infection only when the sedimentation time is more than two hours.

CASE 6.—Mrs. E. P., aged 37 years, entered the hospital complaining of fever and chills. Her family history, past history and menstrual history were negative. Husband had gonorrhea, patient has had two miscarriages; one child of eight living. Three years ago induced abortion and was very ill. Last period April 10, 1922. On June 15 she inserted a slippery elm tampon into uterus. Slight flow next day; she thinks fetus came away then; had chills and fever following. The family physician made a diagnosis of incomplete abortion and curetted her on June 20, but found the uterus empty. We saw the case the following day and transferred her to the hospital. Sedimentation time 4 minutes. Smears show gonococci.

Diagnosis.—Double pyosalpinx. At request of the family physician we explored the uterus but found it empty. The patient was placed in Fowler's position and an ice bag was put over the uterus. The sedimentation time increased steadily until August 22, 1922, when it was 3 hours. At this time the patient was operated, and both tubes removed. She made an uneventful recovery.

This case illustrates the value of the sedimentation test as an aid in deciding the proper time at which to operate, and demonstrates my usual procedure in such cases, i.e., waiting until the sedimentation time is over two hours before operating.

For comparison the following case is presented, where operation was performed with a low sedimentation time, contrary to the usual policy.

CASE 7.—Mrs. O. F., admitted to the hospital complaining of pain in lower abdomen, some fever, and sterility. She had had one premature labor at seven months and one miscarriage, but since then was sterile. Smears were negative for gonococci, and a pneumoperitoneum was attempted, but the tubes could not be opened. Sedimentation time was 30 minutes, and a diagnosis of pyosalpinx was made. At the request of her physician I operated upon her. Tubes found markedly adherent, uterus retroverted. The adhesions were separated and the tubes dissected free; in doing so, pus was found in both tubes. They were removed, the uterus suspended by the posterior Baldi-Webster method, and the appendix removed. Sedimentation time after operation 20 minutes. A bad prognosis was made, and the patient died three days later of peritonitis. Autopsy confirmed the findings.

Tumors such as simple noninflammatory myomata, cysts and dermoids have a normal sedimentation time, while large myomata, ovarian cysts with a twisted pedicle, and tumors with a tuberculous tendency show a rapid sedimentation time. In carcinoma, and other malignant tumors before they break down, the time is somewhat quicker than normal, but after there is a breaking down the time of sedimentation is very much accelerated.

Application in other Fields of Medicine.—A more general application of the test was conducted on a series of one hundred cases selected at random from the wards of New York City Hospital. The results are tabulated in Table III. and show that the test is valuable in medical cases as well as surgical or obstetric.

TABLE I

	DISEASE	HEMOGLOB.	NUMBER		CYTOLOGICAL COUNT IN %						BLOOD SEDIMENTA- TION IN MIN. TO 18 MM. MARK	
			ERYTHRO- CYTES	LEUCOCYTES	POLYM. NEUTR.	EOSIN.	BASOPH.	LYMPHOCYTES		TRANS.		
								SMALL	LG.			
10	Appendicitis, acute	85	4850000	14,000	86	7			7	2	2	65
28	Appendicitis, chronic	90	4700000	8,200	75	2	3		16			365
6	Pyosalpinx, acute	80	3800000	9,000	88	5			7			16
12	Pyosalpinx, chronic	80	4500000	7,000	66	2	4		28			27
2	Ischio-rectal abscess	90	4650000	12,000	90	5	5					6
4	Ischio-rectal abscess chronic	85	5000000	7,200	63	4	2		22	6	3	120
2	Gall-bladder, empyema	85	4650000	17,000	84	6			10			4
11	Cholelithiasis	90	4300000	8,000	54	4	2		36	2	2	28
3	Ectopic gestation un- ruptured	85	4600000	12,500	76	3	5		12	3	1	40
2	Ectopic gestation rup- tured	75	2800000	13,000	85	4	3		6	1	1	13
1	Ulcer, gastric with local peritonitis	70	3600000	6,000	80	8			12			35
7	Ulcer, duodenal	80	5500000	7,200	52	6	4		33	4	1	100
9	Ulcers, leg, varicose	85	5200000	7,800	63	3			23	8	3	210
2	Burns, infected	90	4700000	15,000	80	5	2		8	3	2	30
8	Wounds, large, granular	80	4800000	6,800	64	2	3		22	6	3	65
3	Joints tubercular	75	3870000	8,400	78	3	4		12	2	1	32
2	Osteochondritis	80	4855000	7,500	67	2	4		16	6	5	234
4	Old fracture joint	90	4950000	8,200	38	2	6		45	5	4	840
1	Spinal column, T. B.	68	3570000	7,200	69	5	2		18	4	3	28
2	Spinal column, osteo- myelitis	85	4000000	12,000	80	10	1		9			21
1	Spinal column, rachitis	75	3860000	8,000	63	3	3		23	5	3	220
120												

N. B. The results above are averaged from 120 cases.

Comparison of Sedimentation Time with other Methods of Determining the Severity of Infection.—I have compared the sedimentation test to the other more commonly employed methods of determining the severity of an infection.

Relation to Temperature.—I find the sedimentation test more reliable and of more general application than the temperature determination, as is also, of course the blood count. Two examples of this will suffice:

CASE 8.—A patient was admitted to the second medical division of New York City Hospital in a comatose condition, with a temperature of 108° F. Examination revealed no pathology in the chest or abdomen, nor any abnormality in the urine or gastric contents. The diagnosis rested between a cerebral abscess and hemorrhage into the fourth ventricle. The sedimentation time of 160 minutes ruled out abscess. Autopsy revealed a hemorrhage into the fourth ventricle.

CASE 9.—Mrs. A. Z., aged 50, was admitted to our service at the Highland Park General Hospital complaining of dull pain in the right lower abdominal quadrant. Her temperature varied between 98.6° and 100.6° F. The sedimentation time was 19 minutes, indicating pus. At operation a well walled off appendiceal abscess was found.

Relation of Sedimentation Test to Hemoglobin, Erythrocytes, Leucocytes, and Cytology.—That the sedimentation test bears no distinct relation to the blood count, and that it is a more reliable indicator of infection can be clearly seen from the outline in Table I, as well as from the two cases quoted below.

CASE 10.—Mrs. J. S., aged 31 years, was admitted to Highland Park General Hospital complaining of leucorrhea and pain in the pelvis and lower abdomen. She had had an appendectomy, amputation of the cervix, and suspension in 1904, but her pains had not been relieved. She gave a definite history of a gonorrheal infection and was treated for it by us two years ago. Her history otherwise was negative. She was a very fat woman. Tenderness over both lower abdominal quadrants. Vaginal examination showed an eroded cervix with a discharge which was negative for gonococci. The uterus was retroverted, and both adnexa were adherent, the tubes being very much thickened and the ovaries not palpable.

Sedimentation time 55 minutes. Leucocytes 8400 with 65 per cent polys. Diagnosis of pyosalpinx was made, though the blood count was normal.

Patient operated upon June 19, 1923. Uterus fibrosed and large. Adnexa found very adherent and massed together. Right adnexa size of hen's egg. Ovaries found neerotic. Tube markedly enlarged, no free pus. Left adnexa similar, except that they formed a smaller mass. Adnexa were removed, and an hysterectomy done. Patient made an uneventful recovery. Pathologist reported purulent salpingitis.

Although the sedimentation time was under two hours, the patient insisted on being operated upon, because of the severe pain. Contrary to the usual findings in such cases, the patient had no postoperative complication. The case demonstrates, however, the accuracy of the sedimentation test, as pus was found by the pathologist.

CASE 11.—Mr. M. M., aged 35 years was admitted to Highland Park General Hospital, May 28, 1923, complaining of attack of pain in abdomen with nausea and vomiting. Family history negative; past history negative. Present illness be-

gan ten days ago with sharp pain in upper right quadrant, accompanied by vomiting. Pain lasted two to four hours then subsided. Has had similar attacks for one year. Another attack two days before admission. Appetite poor, bowels constipated. Examination shows a yellow tinge to the sclera. Slight rigidity over gall-bladder area. Positive Morris sign. X-ray revealed no gall-stones. Sedimentation time 35 minutes. Patient walks fairly comfortably; no fever; blood count shows 10,300 leucocytes with 62 per cent polys.

Diagnosis.—Chronic cholecystitis. Chronic appendicitis. Pus was suspected somewhere, due to the low sedimentation time.

TABLE II

COMPARISON OF BLOOD SEDIMENTATION TIME AND BLOOD CHEMISTRY

DIAGNOSIS	UREA NITROGEN MG. PER 100 C.C.	CREATININE MG. PER 100 C.C.	URIC ACID MG. PER 100 C.C.	SUGAR MG. PER 100 C.C.	SEDIMENTA- TION TIME
Alcoholism	13	1.5	3.2	130	290
Anemia (pernicious)	17	1.4	...	110	60
Arteriosclerosis (general)	16	1.5	3.6	110	124
Arthritis (acute)	15	1.4	3.2	100	17
Arthritis (chronic)	17	1.4	3.3	120	141
Arthritis (chronic)	21	1.6	3.6	110	79
Arthritis (chronic)	10	...	...	80	60
Arthritis (chronic)	25	1.9	4.0	130	28
Arthritis (chronic)	13	1.5	4.6	110	74
Arthritis (chronic)	23	1.9	5.0	100	90
Arthritis (chronic)	10	1.3	3.4	80	67
Arthritis (chronic)	16	1.9	...	110	95
Arthritis (chronic)	15	1.4	3.1	90	1440
Cardiac valvular disease (chronic)	16	1.17	3.6	120	66
“	23	1.8	3.6	90	240
“	15	1.6	3.2	100	300
Cerebral hemorrhage	24	...	...	280	195
Colitis (acute)	27	2.14	3.2	80	24
Diabetes mellitus	13	1.4	3.2	110	95
Myocarditis (chronic)	17	...	...	...	350
Nephritis (chronic)	24	1.6	3.2	130	80
Pleurisy (acute con- valescent)	17	2.0	3.9	130	238
Sciatica	14	2.0	...	105	375
Thrombo-angiitis obliterans	10	1.3	3.0	120	606

Operation May 31, 1923. Ordinary gall-bladder incision. Gall-bladder large, engorged, and adherent. Adhesions separated, gall-bladder opened, and tube inserted and fixed with double purse-string suture. Appendix was sought to ascertain cause of the low sedimentation time. A mass was found in the region of the cecum, densely adherent. It was opened and found to be an appendiceal abscess with encapsulated free pus and a gangrenous appendix at the base. It was removed, a tube inserted through a counter incision and the abdomen closed.

The patient developed a postoperative obstruction of the bowel. Five days later a fecal fistula was formed to permit evacuation of the gas. The patient died two days later.

The above cases illustrate the advantage of the sedimentation test over the blood count, particularly to diagnose the presence of pus.

TABLE III

DISEASE	NO. OF CASES	SEX	AVERAGE AGE	AVERAGE SEDI- MENTATION TIME IN MIN.
Abortion, threatened	1	Female	33	43
Addison's disease	1	Male	41	65
Alcoholism, chronic	2	Male	58	250
Anemia, pernicious	2	Male	60	50
Arteriosclerosis, general	1	Male	77	124
Arthritis, acute	2	Female	41	13
Arthritis, chronic	2	Female	41	111
	15	Male	50	185
Arthritis, acute convalescent	1	Male	22	180
Cardiac valvular disease, chronic	1	Female	43	70
	1	Male	21	66
Cerebral hemorrhage	1	Male	34	195
Colitis, acute	1	Male	61	24
Diabetes mellitus	2	Male	60	94
Endocarditis, acute	1	Female	17	27
Epithelioma of bladder	1	Female	60	164
Gonococcus arthritis	3	Male	38	101
Gonococcus epididymitis	1	Male	32	53
Gonococcus ophthalmia	1	Male	42	89
Gonococcus urethritis, acute	5	Male	27	207
Hemiplegia	1	Male	58	210
Hydrocele	1	Male	74	361
Hysteria	1	Male	24	440
Influenza	1	Male	23	25
Leg Ulcer	3	Female	60	226
	1	Male	51	251
Myocarditis, chronic	5	Male	58	244
Nephritis, chronic	1	Male	42	80
	1	Female	50	55
Noma of palate (Complicated by terminal bronchopneumonia).	1	Female	40	12
Paget's disease	1	Male	48	90
Paresis, general	4	Male	52	386
Pleurisy, convalescent	1	Male	61	238
Pleurisy, acute	1	Male	54	20
Pneumonia, lobar	2	Male	42	16
Pneumonia, lobar, convalescent	1	Male	26	202
Pneumonia, broncho	1	Female	33	15
	1	Male	55	9
Puerperal sepsis	1	Female	32	25
Scabies	2	Male	16	248
Sciatica	1	Male	42	375
Senile hypertrophy of prostate	4	Male	70	205
Syphilis	7	Female	42	220
	9	Male	40	148
Tabes dorsalis	1	Male	57	325
Thrombo-angiitis obliterans	1	Male	40	606
Tuberculosis, hip	1	Male	19	185
Tuberculosis, pulmonary	1	Male	42	132
Tuberculosis, kidney	1	Male	18	131
Typhoid, acute	1	Female	43	15
Typhoid, convalescent	1	Male	11	85
Urinary incontinence	1	Female	52	331

Relation of Sedimentation Time to Blood Chemistry.—In a series of 24 cases, the chemistry and sedimentation time of the blood were compared (Table II). This was interesting particularly in respect to the uric acid content, which is claimed to be an indicator of infection, rising in direct proportion to the severity of the infectious process.

If this is so, the uric acid content should be inversely proportional to the sedimentation time. That is, in an infectious process, the sedimentation time would be low, while the uric acid would be higher than normal.

Eighteen of the twenty-four cases had uric acid estimated. In all but four cases, the uric acid was 3.6 mg. per 100 c.c. of blood, within normal limits, or less, although in a large number of these cases the sedimentation time was quite rapid. In a case of acute arthritis, for example, with a sedimentation time of 17 minutes, the uric acid was 3.2. On the other hand, in a convalescent case of acute pleurisy, whose sedimentation time of 238 minutes showed a cessation of the acute process, a uric acid content of 3.9 was obtained.

Three cases of chronic arthritis deformans, with undoubtedly unrevealed infectious foci, whose sedimentation time were 28, 74, and 90 minutes respectively, showed uric acid content of 4.0, 4.6, and 5.0. All had gouty tendencies.

A case of acute colitis with a sedimentation time of 24 minutes showed a uric acid content of 3.6 mg. per 100 c.c. of blood.

From this limited series, it is apparent that the sedimentation test is a far more delicate indicator of infectious processes than the uric acid content of the blood.

Comparison with Hematoclastic Crisis.—The so-called hematoclastic crisis of Widal proved interesting as a comparative test, because it also is supposed to be produced by the absorption of foreign proteins. In normal digestion the proteids are broken up in the first part of the gastrointestinal tract and the liver into amino acids, and pass into the blood stream in this assimilable form causing a digestion leucocytosis. In any form of hepatitis, such as is found in acute yellow atrophy, syphilis, gall-bladder disease with obstruction of the bile ducts, after salvarsan administration, and, as is claimed by some workers, in pregnancy, the proteins are not completely reduced to amino acids in the liver, and hence albumoses and proteoses are introduced directly into the blood stream, producing an anaphylactic shock, the hematoclastic crisis of Widal. This manifests itself by a drop in blood pressure, rapid pulse, subnormal temperature, prostration and sometimes by chills and vomiting. These cases show a leucopenia of 40 to 60 per cent.

If the accepted explanation for this phenomenon is true, similar diseases should produce a lessened sedimentation time because it also is produced by absorption of foreign material, such as pus, inflammatory products, placental secretion etc. With this in mind, forty-seven patients were tried by both tests. The normal blood pressure and the leucocyte count were determined. The patients were then fed 300 c.c. of milk on a fasting stomach. Twenty, forty and sixty minutes later

leucoeyte count, blood pressure and sedimentation time were determined. The results are tabulated below.

No. of cases	Diagnosis	Leucoeyte count	B. P	S. T.
20	Healthy individuals (for control)	Normal	Normal	Normal
9	Pregnancy 9 months	No change	No change	Diminished
7	Pregnancy 5 months	No change	No change	Diminished
3	Syphilis (after salvarsan administration)	Leucopenia	Diminished	Diminished
2	Passive Congestion of liver	50 to 60 per cent	Diminished	Diminished
2	Emphyema of gall-bladder	Leucopenia	Diminished	Diminished
4	Cholelithiasis	Leucopenia	Diminished	Unchanged

It will be seen that in pregnancy where there is some hepatic disturbance no hematoelastic crisis is noted, though the sedimentation time is diminished. In passive congestion of the liver, where there is certainly a hepatitis, the blood pressure dropped, but no leucocyte change could be noted. Nevertheless, there was a marked drop in sedimentation time. Only in cholelithiasis, where the hematoelastic crisis would indicate a hepatitis with absorption, was the sedimentation time unchanged, indicating that no absorption took place, and that the sedimentation test is a far more accurate method of determining absorption of foreign proteins than is the hematoelastic crisis of Widal.

Correlation of Sedimentation Test and Capillary Circulation.—As far as the correlation of the test with capillary circulation is concerned it is of interest to note the very valuable contribution of Warren Plimpton Lombard of Ann Arbor, Michigan, on the physiology and morphology of the capillaries of the human skin (*Zentralblatt für Physiologie*, 1911, and *American Journal of Physiology*, 1912). The method as described by him in his own words is as follows: "To obtain a view of the most superficial blood vessels of the human skin, it is only necessary to put a drop of glycerine or transparent oil on it, and examine by a strong light with a microscope. One can see the capillaries even with a hand lens magnifying ten times, but higher power gives better pictures."

I wish to emphasize the fact that the observation of the capillaries, in spite of the simplicity of Lombard's method, is not so easy a matter. It requires a great deal of practice to interpret the facts of capillary circulation. In all my observations I used the Leitz Lilliput lamp and employed Zeiss objective A. A., oculars 2, 3, and 5, with a magnification of 42-120 times.

In checking up the work of Linzenmeier regarding the relation of capillary circulation to blood sedimentation, I find, as he did, that the capillaries of a healthy person show a uniform circulation of fine granular bodies. If compared with the pictures from a parturient

woman, or a woman with a high fever, it is seen that the observation in the case of the abnormal subjects is much simpler on account of the coarse granulations which are unevenly divided in the blood stream of the capillaries. The blood stream gives the impression of being broken in two, which Linzenmeier attributes to the rouleau formation of the erythrocytes. Not only a granular blood current can be observed, but also a high degree of clumping of red blood cells which, as can be observed in the capillaries of the hand, causes stasis. There is a parallelism between the time of blood sedimentation and the capillary circulation. People who have a slow sedimentation time show no stasis, while in those whose blood sediments quickly, a granular circulation and a stasis can be demonstrated. Linzenmeier comes to the conclusion that a granular circulation and stasis are due to the hemoagglutination, and that the blood sedimentation test is a good indicator of these conditions.

Sedimentation Test as an Aid in Prognosis.—I have gone into the diagnostic value of the sedimentation test as fully as a single paper permits. Before closing, however, it seems advisable to mention its use as a prognostic agent, showing its application to be almost unlimited.

In any serious disease condition, particularly one where conservative treatment is carried on over a protracted period of time, some indicator of the progress of the disease process is absolutely essential. Physical signs are, unfortunately, limited in value. Occasionally some ineffectual and dangerous method like the provocative "trick" to determine whether a pelvic affection is latent by stimulating its progress is brought forward. If it does not harm the patient, it does no good at all. It is in such instances that the sedimentation test is of exceptional value. In fact, in my experience nothing else has proved of any use whatsoever.

In pelvic disease, for example, it is advisable to wait until the active infection has subsided. I determine this, as has been said before, by a sedimentation test of two hours or over. The rise of the sedimentation time is a sure indicator that the case is improving. If it remains low the prognosis is poor. Two examples of this have been given above (Cases 6 and 7). Two other examples showing the value of the sedimentation test in prognosing puerperal sepsis follow:

CASE 12.—Mrs. M. K., aged 32 years was admitted to the hospital, complaining of chills and fever. Family history, past history and menstrual history were negative. Last period three months before admission. She performed an abortion by inserting a blunt instrument into her uterus. Twenty-four hours later she commenced to bleed and claims she lost placenta and fetus. Three days later she was seized with chills and fever; temperature 104° - 105° on admission. A diagnosis of puerperal sepsis was made. Sedimentation time on admission eight minutes. Neutral acriflavine was given intravenously in 1 per cent solution. A chill followed.

During the chill her sedimentation time was again found to be eight minutes. Following it, with the temperature almost normal, it was 20 minutes.

The following day her sedimentation time varied from 20 minutes during the chill following the injection of the neutral acriflavine to 85 minutes while afebrile. A good prognosis was given. The third day the sedimentation time varied from 30 minutes to 96 minutes, and only a very slight chill was noted, while the temperature dropped almost to normal. The next day the sedimentation time varied from 105 to 125 minutes, and the fifth day, the patient's temperature was normal, she had no chill whatever, and her sedimentation time was 120 minutes.

Discharged one week later. *Diagnosis*.—Sapremia, cured.

CASE 13.—Mrs. K. L., aged 24, admitted to the hospital with chills and fever. Family history and past history unimportant. Last menses eight months ago. Married three years; first pregnancy. Complains of dysuria; history of leucorrhea since marriage. One week ago had slight bloody discharge with some fever. Admitted to hospital with temperature of 104° and chills.

Examination revealed a seven months' pregnancy. Os dilated; slight bloody discharge. Smears from Bartholin's and Skene's glands positive for gonococci. Sedimentation time, eight minutes. Twenty-four hours later, patient delivered spontaneously. Temperature dropped to 99° for six hours, then rose to 100°-105° with chills. Sedimentation time, 14 minutes at this time.

Diagnosis.—Puerperal sepsis. Neutral acriflavine 1 per cent given intravenously. During chill sedimentation time, 12 minutes. During lowest temperature eight minutes.

Next day, sedimentation time varied from 9 to 10 minutes. Prognosis poor because of lowered sedimentation time. Following day it varied from 7 to 13 minutes. The fourth day, the patient died.

From the cases mentioned, the value of the sedimentation test as a prognostic aid is apparent. I have advised it in the prognosis of tuberculosis and other diseased conditions, but full details of these cases are beyond the scope of this paper.

CONCLUSIONS

1. Although the blood sedimentation test yields no practical results for the diagnosis of pregnancy until a general biologic reaction has taken place, i.e., after the fourth month, its negative findings are of material aid in differentiating pregnancy from simple tumors after the fourth month.

2. It is of some aid in diagnosing unruptured ectopic.

3. Ruptured ectopic, having about the same sedimentation time as pelvic inflammatory conditions, must be diagnosed by exclusion.

4. The diagnosis of pelvic inflammatory conditions can readily be confirmed by the test.

5. The reaction is especially valuable in gynecology to determine whether a patient with an inflammatory adnexal disease, but with a normal temperature and a normal blood count, should be subjected to operation. A sedimentation time under 30 minutes means active infection, under one hour latent infection, and the patient must not

be operated upon. However, a sedimentation time of over two hours excludes all possibility of a latent or active infection, and the patient can safely undergo operation.

6. No dilation, curettage, or other surgical interference should be undertaken before a sedimentation test has been made in order to exclude latent infection of the genital organs.

7. The value of the test is corroborated by its application to medical cases, inasmuch as all such cases which involve an infectious process show a great decrease in sedimentation time.

In conclusion, I wish to express my indebtedness to Dr. R. H. Koebel, my gynecologic assistant at the clinic of the Woman's Hospital, for his aid during the progress of this work, to Mrs. Ruth Winstead, Miss Jane Hart and Miss Florence Bassett for their hearty cooperation, and to my associate Dr. Emil Rothman, formerly house physician, New York City Hospital, whose suggestions and criticisms have been very valuable.

BIBLIOGRAPHY

- (1) *Abderhalden*: Fermentforschung iv, 230. (2) *Agazzi*: Ztsch. f. Immunforsch., 1909, p. 726. (3) *Bennigshof*: Münch. Med. Wehnsch., 1921, No. 41. (4) *Biernacki*: Ztsch. f. physiol. Chemie, 1894, xix. Ztsch. f. klin. Med., 1896, xxi. (5) *Borchardt*: Therap. Halbmonatsch., 1921, No. 19. (6) *Borchardt*: Münch. Med. Wehnsch., 1915, No. 45. (7) *Brat*: Ueber Senkung u. Agglut. S. Blutkorp. Ztsch. f. klin. Med., 1905, lvi. (8) *Bürger*: Therap. Halbmonatsch., 1921, No. 13, 14, 15. (9) *Büscher*: Berl. klin. Wehnsch., 1921. (10) *Burns and König*: Ztsch. f. physik. u. diätet. Therap., 1920, xxiv. (11) *Carrell*: Jour. exp. med., 13, 14, 15. (12) *Carrell*: Presse méd., 1913, No. 17. (13) *Dieter and Chau-Sung-Sdeng*: Ztsch. f. d. ges. exper. Med., 1922, xxviii, No. 1/4. (14) *Davy*: Jour. Physiol. and Anat. Researches, London, 1839, ii. (15) *Fahraeus*: Hygiea 1918, and Biochem. Ztsch., lxxxix, Nos. 5 and 6. (16) *Ferner, Müller, Ojfr*: Deutsch. med. Wehnsch., 1906, p. 1531. (17) *Friedberger and Masudo*: Therap. Halbmonatsch., 1911, No. 5. (18) *Funke*: Lehrbuch der Physiologie, 1860. (19) *Gabbe*: Münch. med. Wehnsch., 1921, No. 43. (20) *Galen*, C.: Opera omnia. Editio Kühn, Leipzig, 1821, xviii, Vol. de Elem. L. 11 c, 2. T. I. p. 426. (Zitiert according to H. Nasse) (21) *Geppert, F.*: Berlin. klin. Wehnsch., 1921, No. 10. (22) *Grafe*: Klin. Wehnsch., 1922, No. 19. (23) *Grosser*: Arch. f. mikr. Anat., lx. (24) *Gyorgy*: Biochem. Ztsch., 1921, cxv. (25) *deHaan*: Jour. Biochem., Ztsch., 1918, lxxxvi, Nos. 5 and 6. (26) *Haselhorst*: Deutsch. med. Wehnsch., 1922, No. 33. (27) *Herzfeld and Klinger*: Biochem. Ztsch., 1921, lxxxiii; 1918, lxxxvii. (28) *Hinselman*: Zentralbl. f. Gynäkol., 1921, xlv, No. 17; and 1922, xlv, No. 36; Deutsch. med. Wehnsch., 1921, No. 21; med. Klinik, 1921, No. 13. (29) *Hirschfeld*: Korrespondenzbl. f. Schweiz. Ärzte, 1919, No. 31. (30) *Hüber*: Pflüg. Arch., 1904, cii. (31) *Hüber*: Dtsch. med. Wehnsch., 1920, No. 16; Biochem. Ztsch., cix. (32) *Hüber*: Arch. f. d. ges. Physiol., 1904, ci and cii. (33) *Hunter*: Jour. Versuche über das Blut, Leipzig, 1791, ii, 173. (34) *Hoyer*: Arch. f. mikr. Anat., 1877, xiii. (35) *Jürgensen*: Dtsch. Arch. f. klin. Med., 1920, cxxxii, 204. (36) *Katz*: Klin. Wehnsch., 1922, No. 27. (37) *Klemperer and Rosenthal*: Ztsch. f. klin. Med., lxxxvi, No. 1. (38) *Kozawa*: Bioch. Ztsch., 1914, lx. (39) *Kürsten*: Pflügers Arch. f. d. ges. Physiolog., 185. (a) Lombard, Zentralbl. f. Physiolog., 1911, xxv, 157. (b) Lombard Americ. Jour. physiol., 1912. (40) *Landsteiner and Jacie*: Wien. klin. Wehnsch., 1904, No. 3; Münch. med. Wehnsch., 1904, No. 27. (41) *Linzenmeier*: Zentralblatt, f. Gynäkol., 1922, No. 14. (42) *Linzenmeier*: Archiv. f. Gynaekol., 1920, cxlii, No. 3, 605. (43) *Linzenmeier*: Zentralbl. f. Gynäkol., 1921, No. 10, 1920. (44) (a) *Lehmann, C. G.*: Lehrbuch d. physiolog. Chemie, 1853, ii. (b) *Idem*: Lehrb. d. Zoochemie, 1858. (45) *Löhr, H.*: Ztsch. f. d. ges. exper. Med., 1922, xxvii, H. 7/2. (46) *Idem*: Ztsch. f. d. ges. exp. Med., xxiv, H. 1/4; xxiv, H. 5/6. (47) *Idem*: Med. klin., 1921, No. 21. (48) *Idem*: Klin. Wehnsch.,

1921, No. 10. (49) *Lohr, Wm.*: Zentralbl. f. Chirurg., No. 35. (50) *Idem*: Mitt. a. d. Grenzgeb., 1921. (51) *Idem*: Deutsch. med. Wehnsch., 1922, No. 12. (52) *Löhr, Wm., and Löhr, Hans*: Ztsch. f. d. ges. exper. Med., xxix, H. 3/4. (53) *Marloff*: Pflügers Arch., 1919, clxxv. (54) *Modrakowski and Orator*: Wien. klin. Wehnsch., 1917, No. 35. (55) *Moog*: Med. Klin., 1919. (56) *Moll*: Wien. klin. Wehnsch., 1913, No. 44. (57) *Müller, Johan*: Handbuch der Physiologie, 1844, i. (58) *Müller and Romberg*: Ztsch. f. klin. Med., 1912, lxxv, 93. (59) *Meyers, W.*: Zentralbl. f. Bakteriologie, 1900, xxviii. (60) *Nasse, Herm.*: Das Blut in mehrf. Beziehung, Bonn, 1836. (61) *Nasse, Herm.*: Das Blut in Rud. Wagner's Handwörterbuch, Braunschweig, 1842, i. (62) *Nasse, Herm.*: Das Blut der Schwangeren, Arch. f. Gynäk., 1875, i. (63) *Neumann*: Berl. klin. Wehnsch., 1920, p. 826. (64) *Oppenheimer*: Handb. d. Biochemie, 1910, ii. (65) *Plant*: Münch. med. Wehnsch., 1920, No. 10. (66) *Popielski*: Ztsch. f. klin. Med., 1896, xxiv (Brat). (67) *Przygode*: Berlin. klin. Wehnsch., 1913. (68) *Rosenberger*: Zentralbl. f. inn. med., 1921, xlii, 26. (69) *Sachs, H.*: Kolloid-Ztsch., 1919, xxiv; Therap. Monatsch., 1920. (70) *Sachs, H. and v. Oettingen*: Münch. med. Wehnsch., 1921, No. 12; and Biochem. Ztsch., 118. (71) *Sackur*: Grenzgeb. d. Med. u. Chir., viii. (72) *Schumacher*: Arch. f. mikr. Anat., lxxi. (73) *Schur*: Wien. klin. Wehnsch., 1919. (74) *Schurer and Eimer*: Berlin. klin. Wehnsch., 1921, No. 42, p. 1251. (75) *Starlinger, W.*: Biochem. Ztsch., 1921, exiv, 121. (76) *Starlinger, W. and A. Frisch*: Ztsch. f. d. ges. experim. Med., xxiv, Nos. 1-4. (77) *Suquet*: D'une circulation derivative dans les membres et dans la tête chez l'homme. Paris, 1862. (78) *Togawa Tokuyi*: Biochem. Ztsch., 1920, cix. (79) *Van den Velden*: Deutsch. Arch. f. klin. Med., exiv. (80) *Virchow, R.*: Verhandl. d. Gesellsch. f. Geburtsh., Berlin, 1848, iii. (81) *Weiss*: Deutsch. Arch. f. klin. Med., 1916, exix, 1. (82) *Idem*: Münch. med. Wehnsch., 1917, p. 925; 1917, p. 609. (83) *Idem*: Wien. Klin. Wehnsch., 1918. (84) *Idem*: Med. Klinik, 1920. (85) *Weiss and Holland*: Ztsch. f. exp. Pathol. u. Therap., 1921, xxii, 108. (86) *Weiss and Dieter*: Zentralbl. f. Herz-u. Gefäßkrankh., 1920, xii, 295.

304-5 KRESGE BLDG.

REFLECTIONS UPON HOSPITALS*

BY JOHN W. KEEFE, M.D., F.A.C.S., PROVIDENCE, R. I.

WE of today can scarcely realize how comparatively few were the hospitals in this country previous to the Civil War, and these were established chiefly to care for the poor who became ill. The hospitals constructed during the war, for the wounded soldiers, taught the people the desirability of erecting hospitals in the larger cities, for the accommodation of the sick poor. These hospitals proved of great value, not only in adequately caring for patients, but also in educating the medical profession, as these institutions were frequently used as teaching centers and thus the physicians became more expert in the diagnosis and treatment of disease.

It was soon apparent that the poor often received a higher grade of medical treatment than persons who were financially better situated. Then came a time when patients sought the hospital who were able to pay a moderate sum for board and nursing in the wards. Later we find those who applied for admission not only were willing to pay the hospital for board and nursing, but also were willing to pay the physician for medical treatment.

*Read at the Thirty-sixth annual meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

Today we have reached a period where the millionaire may find in the hospital a beautiful suite of rooms, where highly trained nurses and physicians minister to his wants.

While vast has been the development of hospitals in this short period the growth in number has been so phenomenally rapid that of necessity many problems remain unsolved; yet, I am convinced that by the deep thought and careful study which will be given to this subject of hospitals, many of the present defects will be eliminated in the not too distant future.

The first problem that confronts a community is the desirability or necessity of having a hospital. A painstaking consideration should be given to these fundamental questions by a committee competent to judge, following a careful survey of the local conditions.

Very often a few individuals actuated by good intentions, but ignorant of hospital needs and management, create a public clamor and raise money. The money raised is promptly spent on land and buildings without adequate consideration of present and future problems. These same well-intentioned persons who raised the money spend it and very likely continue their control of the enterprise, appointing their executives and medical staff.

Physicians should have a more prominent part to play in the management of hospitals than they have had in the past.

Their intimate contact with people when they are sick, ailing and complaining, engenders a sympathy and arouses a love for their fellow man.

It is quite natural that the physician should look at hospital problems in a different manner from the successful merchant, manufacturer, or socially prominent man; but why, in the name of common sense, cannot physicians and laymen cooperate and both give of their skill and knowledge for poor suffering humanity.

Why exclude the physician from the board of trustees and select men who too often lend only their names. The members of the board of trustees of our hospitals, with a sufficient number of exceptions to prove the rule, devote an insufficient amount of their time to acquiring a knowledge of the many phases of hospital management.

I once heard it said of a trustee of a hospital that at a meeting of the board he said in criticism, "Why, gentlemen, this is not the way we run our mills," and a fellow-trustee said, but "This is not a mill that we are running."

And so it is, a hospital is distinct from any other institution or business and requires an understanding primarily of the mission of hospitals, which can be summed up in a few words, as the adequate, efficient and interested care of sick people.

A trustee of a hospital should become familiar with the many problems he will have to cope with by study, by travel, and by visiting

other hospitals. What a boon to humanity is the big, human, kind-hearted man who really gives unstintingly of himself in the service!

Sentiment should fill a prominent part in the care of the sick; too often we find it wanting, due in a large measure to cold-blooded business managers.

The correct solution of hospital problems can only be reached through a study of hospital problems. The men selected to conduct or manage the steel mills, the cotton mills, or woolen mills are selected with care and because of their expert knowledge of these various industries.

We will all admit that twenty hospitals would be too great a number for a city with a population of 300,000. Do we need ten or five? You will readily see that the number and the type of hospital to be erected requires careful consideration and an adequate survey. The initial cost of the building is trifling compared with the annual expense of conducting the same.

May we not by enthusiasm and thoughtlessness, impose a burden of taxation upon the people that is greater than they should properly be asked to bear.

We must remember that the money paid by the state and city is derived from all the taxpayers, and so of necessity the day is coming when the people will rightly demand representation in the governing bodies of hospitals.

The site, or location, for a hospital may appear to be a problem easy of solution, until one considers whether it should be placed on a hill, or in a valley, adjacent to factories, with the noise and smoke accompanying them; or in a residential section; or where it may best serve the patients. The outlook over the adjacent country should give pleasure.

Many times we have observed that the site selected was due to a grant of land or family residence which had outlived its usefulness; or that a certain piece of property could be acquired for a small sum of money; little regard having been paid to other factors, such as room for expansion, future requirements, outlook, scenery, freedom from noise and ease of access to the patients by their friends.

The automobile has rendered it possible to select a site beyond the center of a city or town.

The plans should not be left solely to the architect. He should consult with the physicians and the nurses with reference to many details of the various hospital problems; such as the location of operating rooms, bath rooms, laboratories, light, and many other phases of hospital construction.

The experience of physicians and nurses equip them with a practical knowledge of the care of patients, which should be utilized by the architect, who should be a man of broad vision and one who has sufficient humility to accept advice, even from physicians and nurses.

I do not wish to infer that all physicians, or all nurses take an interest in hospital details, but there are some in every hospital who do.

The board of trustees, the superintendent, the physicians, the nurses and the architect should all work in harmony, and ever keep before their minds, the cause for the existence of the hospital, namely, the welfare of the patients.

Should we have wards in a hospital? If so, how many should they accommodate? Some hospitals have wards containing twenty, thirty, fifty and even seventy beds; although the present tendency is toward small wards of four, or six beds.

The ideal hospital would be one where each patient has a separate room.

Hospital ventilation is a subject with which the physician should be familiar, and greater stress should be given to this important requirement of the patient.

How many expensive and theoretical ventilating schemes have been installed which failed to ventilate?

Operating rooms are often located so that they receive light from two points of the compass, say south and east, rather than light from the north. When adequate light is so essential to the performance of an operation, why handicap the operator to the detriment of his patient by a defective lighting system when a suitable method of lighting could be so readily provided.

The late Dr. Charles McBurney, who had the direction of the building of the Sims operating theatre in New York, once told me that he had given more thought to the lighting of the amphitheatre than to all the details of the remainder of the building. The views of this master of surgery demonstrate the value he placed upon the necessity of suitable light in an operating room.

Often we find the laboratory and etherizing rooms too remote from the operating rooms. Why not etherize in the operating room, where there is always a sufficient number of assistants, should an emergency arise?

The physician should demand that he be taken into council when these important adjuncts in the care of the sick are under discussion.

The public, including the governing bodies of our hospitals, should be educated to the importance of a careful study of the details of hospital construction and management.

The question arises, should a nurse, a physician or a competent business man be selected to manage a hospital?

Should a hospital be conducted as an open hospital where any licensed practitioner may care for his patient? Is this method the best for the patient in the long run?

It would appear at times that the welfare of the patient, which should

other hospitals. What a boon to humanity is the big, human, kind-hearted man who really gives unstintingly of himself in the service!

Sentiment should fill a prominent part in the care of the sick; too often we find it wanting, due in a large measure to cold-blooded business managers.

The correct solution of hospital problems can only be reached through a study of hospital problems. The men selected to conduct or manage the steel mills, the cotton mills, or woolen mills are selected with care and because of their expert knowledge of these various industries.

We will all admit that twenty hospitals would be too great a number for a city with a population of 300,000. Do we need ten or five? You will readily see that the number and the type of hospital to be erected requires careful consideration and an adequate survey. The initial cost of the building is trifling compared with the annual expense of conducting the same.

May we not by enthusiasm and thoughtlessness, impose a burden of taxation upon the people that is greater than they should properly be asked to bear.

We must remember that the money paid by the state and city is derived from all the taxpayers, and so of necessity the day is coming when the people will rightly demand representation in the governing bodies of hospitals.

The site, or location, for a hospital may appear to be a problem easy of solution, until one considers whether it should be placed on a hill, or in a valley, adjacent to factories, with the noise and smoke accompanying them; or in a residential section; or where it may best serve the patients. The outlook over the adjacent country should give pleasure.

Many times we have observed that the site selected was due to a grant of land or family residence which had outlived its usefulness; or that a certain piece of property could be acquired for a small sum of money; little regard having been paid to other factors, such as room for expansion, future requirements, outlook, scenery, freedom from noise and ease of access to the patients by their friends.

The automobile has rendered it possible to select a site beyond the center of a city or town.

The plans should not be left solely to the architect. He should consult with the physicians and the nurses with reference to many details of the various hospital problems; such as the location of operating rooms, bath rooms, laboratories, light, and many other phases of hospital construction.

The experience of physicians and nurses equip them with a practical knowledge of the care of patients, which should be utilized by the architect, who should be a man of broad vision and one who has sufficient humility to accept advice, even from physicians and nurses.

I do not wish to infer that all physicians, or all nurses take an interest in hospital details, but there are some in every hospital who do.

The board of trustees, the superintendent, the physicians, the nurses and the architect should all work in harmony, and ever keep before their minds, the cause for the existence of the hospital, namely, the welfare of the patients.

Should we have wards in a hospital? If so, how many should they accommodate? Some hospitals have wards containing twenty, thirty, fifty and even seventy beds; although the present tendency is toward small wards of four, or six beds.

The ideal hospital would be one where each patient has a separate room.

Hospital ventilation is a subject with which the physician should be familiar, and greater stress should be given to this important requirement of the patient.

How many expensive and theoretical ventilating schemes have been installed which failed to ventilate?

Operating rooms are often located so that they receive light from two points of the compass, say south and east, rather than light from the north. When adequate light is so essential to the performance of an operation, why handicap the operator to the detriment of his patient by a defective lighting system when a suitable method of lighting could be so readily provided.

The late Dr. Charles McBurney, who had the direction of the building of the Sims operating theatre in New York, once told me that he had given more thought to the lighting of the amphitheatre than to all the details of the remainder of the building. The views of this master of surgery demonstrate the value he placed upon the necessity of suitable light in an operating room.

Often we find the laboratory and etherizing rooms too remote from the operating rooms. Why not etherize in the operating room, where there is always a sufficient number of assistants, should an emergency arise?

The physician should demand that he be taken into council when these important adjuncts in the care of the sick are under discussion.

The public, including the governing bodies of our hospitals, should be educated to the importance of a careful study of the details of hospital construction and management.

The question arises, should a nurse, a physician or a competent business man be selected to manage a hospital?

Should a hospital be conducted as an open hospital where any licensed practitioner may care for his patient? Is this method the best for the patient in the long run?

It would appear at times that the welfare of the patient, which should

be the first consideration, is only incidentally considered, yet the hospital was really built to care for him.

The organization of the medical staff of a hospital is a problem worthy of deep thought. Is our present system of organization in most of the hospitals in this country, with a few notable exceptions, the best one obtainable?

The Johns Hopkins Hospital made an enviable position for itself in the country, not only because of an Osler, a Halstead, a Kelly and a Welch, but also because of the system of organization.

A responsible head to each department, who had the power to select his associates and control the medical treatment of the patients was the basis of the success of their organization.

All successful organizations, whether for business, education, or religion, should have a head or chief, with subchiefs to the various departments.

Should internes be paid for their services, or should they be compensated by allowing them to perform major operations before they are sufficiently trained?

The nursing problem is in a state of evolution at present. Many think the course of three years at a training school is too long, some think it is not long enough. There is a shortage of nurses in the country. How is it to be supplied? Should we have intensive training for two years with less time spent in sweeping, dusting and bed making and more time in acquiring an accurate knowledge of the essentials of practical nursing?

Some hospitals have adopted the eight hour shift. Are we to have eight hour shifts in private practice in the home? Many people in moderate circumstances today cannot afford to employ a trained nurse. Should we therefore educate some nurses for a shorter period, who would receive a smaller fee for their services?

These and many other problems confront us today, and how shall they be met?

The Rockefeller Foundation selected a committee to report upon the many phases of the nursing problem; following a study of nearly three years, a report was submitted in 1922.

Among numerous sound suggestions was one advising a course of twenty-eight months in a training school for nurses.

Also that a subsidiary type of nurse may be developed and trained for a shorter period, say nine months. They may be employed to nurse cases of minor illness and convalescents.

The name of this class of worker is important, and among the suggestions we find nursing aide, nursing attendant and practical nurse.

In conclusion, may I say that I have intentionally raised many questions in order that those interested in hospital problems may cudgel their brains for their solution.

Physicians should awaken and take a more prominent part in the hospital programme.

A plea for greater harmony and closer cooperation between the various bodies that govern and carry on the work of hospitals.

262 BLACKSTONE BOULEVARD.

(For discussion, see page 206.)

CUTTING THE ILEOCECAL FOLD AS A ROUTINE MEASURE IN THE OPERATION FOR APPENDICITIS*

BY GEORGE F. CHANDLER, M.D., F.A.C.S., KINGSTON, N. Y.

EVERY active physician or surgeon often sees a patient with symptoms referable to the alimentary tract that bring to his mind a definite condition located in the right iliac fossa.

The patient states that she has vague distress in the abdomen before or after eating. Food doesn't seem to make much difference, but she is troubled with gas, or a feeling of fullness from time to time which may often be relieved by "breaking up gas," as she expresses it. Constipation is present as a rule and the appetite often is excessive. There is also an occasional feeling of weight or a certain amount of tenderness which is increased to actual pain at times in the right and lower part of her abdomen. The patient does not look very healthful and is usually inclined to be of the type we speak of as having nervous irritability commonly known as neurasthenia.

On questioning it will be found that for the past few years there have been attacks of sharp pain, usually lancinating in character, to the right of the navel followed by some soreness which is attributed to colic from some indiscretion in diet. These attacks of pain have occurred at any time of the day.

The patient has never been awakened at night by a sharp pain in the epigastrium so characteristic of ulcer of the stomach, nor ever noticed that she is bloated an hour or more after eating, as in cholecystitis.

On physical examination, after eliminating lesions of the gall bladder, ureter, pelvis, etc., everything will be found normal except that there is an area of tympany, unusually extensive, over the cecum, with some gurgling, and on deep pressure in this region a tenderness which will often make her wince. What is to be done for such a case?

A diet of thoroughly cooked food, the refusal of raw milk, soups and greases, with some form of alkaline therapy, and attention to the bowels may relieve, but as a rule these cases are not benefited much by treatment. They go from doctor to doctor in search of relief.

*Read at the Thirty-sixth annual meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

Dr. Alfred Taylor, in a very able paper read before the Quiz Medical Society of New York, stated that one out of every five fetuses examined showed that this number of individuals were born with bands or cobweblike membranes and the like in the region of the ileocecal valve. In other words, the so-called Jackson's membrane, Lane's kink and other abnormalities seem to be present as a result of imperfect development (before birth). Some authorities claim that they are the result of inflammation.

These abnormalities have been elucidated by Dr. William Mayo. The point that I am trying to bring out is that the symptoms these patients have are due to a mechanical fault, therefore the treatment logically must be mechanical in nature.

Dr. A. Rendle Short says, "We are coming to look upon the stomach and intestines as resembling a canal system with lock-gates connected by telephone, so that the state of traffic at one lock has an influence upon the rate at which boats are allowed through the locks above and below." According to Keith, there are seven sphincters or locks in the alimentary canal guarding the stomach and intestines, besides one at the junction of the pharynx and esophagus: (1) the cardia; (2) the pylorus; (3) the duodenojejunal flexure, with a special nerve-supply; (4) the ileocecal "valve"; (5) the transverse colic sphincter; (6) the pelvicorectal; (7) the anus.

In describing the ileocecal valve it can be said that it is formed by an intussusception of the end of the ileum through an opening into the cecum with an overdevelopment of a fold of mucous membrane at its end. The intussusception is, of course, slight normally and the valve normally should be competent, with the fold of mucous membrane dropping over the end of the ileum, so as to protect it against the gas pressure formed by the digestion resulting from bacteria in the large intestine.

Dr. P. C. Coffey states that in some cases where there is marked constipation and gas dilatation of the cecum, a reverse peristalsis is set up, the normal intussusception thereby being reduced and the valve interfered with to such an extent that it allows the fetid gas of the large intestine to push back into the ileum producing reverse peristalsis in the small intestine also. Such patients, of course, have a great deal of distress.

These cases have been called "chronic appendicitis" or "recurrent appendicitis," for want of a better name, and are generally known to the laity as "appendicitis" without qualification. The patients frequently make their own diagnosis.

On studying the end results following the operation for such a condition as is usually performed, from the statistics of several well-known operators, I find that about 50 per cent to 60 per cent are permanently cured, 25 per cent bettered, and about 15 per cent to 25 per cent are not improved at all. At the hands of poor operators the percentage of failures must obviously be greater.

Up until about three years ago I had at least one-quarter or more of my cases return to me, and while they apparently were glad to be rid of their appendices, still I could not persuade them to say that they felt any better. I had removed the appendix, freed up a Lane's kink, if it was present, attended to the mechanics of a Jackson's membrane, plicated the cecum if necessary, and could not see why some cases made an excellent recovery and cure while others did not.

I read a good many authors, experimented with glove fingers and rubber tubes, and finally came to this conclusion: That the fold, triangular in shape, containing some fatty tissue, which extends about an inch or more along the terminal end of the ileum, extending to the cecum, interfered with the proper function of the valve; that this fold kept the ileum from freely protruding into the cecum enough to allow the fold of mucous membrane to properly close the opening. Cunningham, in the last edition of his "Anatomy," calls this the ileocecal fold. It has been called the "bloodless fold of Treves," also, the ileoappendicular fold of Jonnesco.

I therefore began to cut this fold in the following way: By placing an artery clamp on the ileal side and another on the cecal side, with a pair of scissors I cut right through to the junction of the ileum with the cecum. In other words, cut from the middle of the base of this triangular fold to its apex and tie off each free segment with cat-gut, and remove the clamps. There is little vascular supply in this fold.

I now do this as a routine procedure in all cases of appendicitis that have not become gangrenous, and since the adoption of this little practice I have yet to have one patient return without benefit from the operation.

Of course, there are several factors that might be considered in my case. Practice makes perfect, and I probably disturb the patient less than I did some years ago. Possibly my diagnosis is better than it used to be, but still the results have been so markedly better in a sufficient number of cases now to make it worth while attributing the benefit to this act.

I have suggested this method to three or four other surgeons, the idea appealed to them and once having started it they now feel that they have not completed an operation for appendicitis without cutting this fold. They agree with me that it is mechanically correct, and the results are bearing out my contention.

I do not claim that this has never been done before, for probably it has, but I have never read of its being done as a routine. While it is a very little thing, still sometimes very far-reaching results come from simple acts.

THE USE OF LOCAL ANESTHESIA IN HANDLING SEPTIC CONDITIONS WITHIN THE ABDOMEN.*

BY ROBERT EMMETT FARR, M.D., MINNEAPOLIS, MINN.

Attending Surgeon St. Mary's Hospital

I BELIEVE it will be accepted as a fact that at the present time the use of local anesthesia is largely limited when dealing with septic conditions within the abdomen to such operations as simple drainage of abscesses, on the one hand, and on the other, to attempt saving cases in *extremis* in which the giving of general anesthesia would be especially hazardous in the surgeon's judgment. My reasons, therefore, for presenting this message are as follows:

First, I believe that limiting the use of local anesthesia to the classifications mentioned above is due in part to the failure of surgeons to realize the facility with which it may be employed.

Second, I believe that the use of local anesthesia offers, in the majority of cases, a better chance for the patient.

Third, I have offered this contribution in the hope that the recitation of some of the alleged advantages of the method in the presence of abdominal sepsis and in addition a more or less detailed description of the technic which has resulted in satisfaction in our hands, might be the means of bringing to a class of patients a greater degree of protection than they have had in the past.

Problem Presented.—The problem presented may be tritely stated as follows: The institution of surgical treatment in any given case of intraperitoneal sepsis demands conservation of the patient's resources to the fullest extent compatible with meeting the surgical indications and this demand may, in certain instances at least, be best met by the employment of the local anesthesia method. In its final analysis the surgical treatment of acute, subacute and chronic intraperitoneal infections may be considered only an effort on the part of the surgeon to assist Nature, first in resisting infection and second in eradicating its results and causative factors. Such assistance is inevitably accompanied by an attack upon the tissue of the patient which must necessarily further reduce his vital forces. Unfortunately also surgical attack is usually followed by general sequelae which are more or less depleting in their effects.

Nature's Efforts.—In analyzing Nature's efforts to meet the onslaught of sepsis, the factor of *rest* stands out most prominently. The localization and isolation of the septic process by the laying down of

*Read at the Thirty-sixth annual meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

a defensive wall of immunity, combined with the development of general bodily defenses, are immediate and constant characteristics of Nature's battle. Splinting of the abdominal muscles, decreased diaphragmatic excursion, inhibition and later the reversal of peristalsis, the formation of visero-visceral and visero-parietal adhesions, obstipation, the posture assumed, general bodily rest and elimination from the economy of the products of sepsis with all possible dispatch, are technical points in Nature's strategy. When local conditions permit, septic products are, through Nature's efforts, drained through the abdominal wall or into some hollow viscus and Nature has, in this manner, saved many lives. Such evacuation of septic material is almost invariably accompanied by an improvement in the patient's condition and while this act is practically always a late manifestation of disease and indicates, as a rule, that for some reason appropriate treatment has been withheld, the fact remains patent that, in instituting drainage, Nature has most carefully conserved the remaining resources and has not in the slightest degree reduced the patient's resistance in carrying out this protective operation. On the other hand, it is perhaps impossible to apply surgical treatment or, in other words, to assist Nature surgically in its effort to combat sepsis without, at the same time, insulting and injuring the patient's economy, both locally and generally, and while it cannot be denied that Nature must frequently be offered surgical aid, it is our duty when rendering assistance to imitate, as far as it lies within our power, Nature's effort in carrying out the same procedure or in meeting the indications as best we can.

Medical Management.—Such factors as the intelligent assistance of Nature in the preoperative management, the time at which surgical intervention should take place, the operative procedure to follow and the amount of surgical manipulation to be employed have, of course, a most important bearing in the management of abdominal sepsis.

Surgical Management.—The surgery of abdominal sepsis is practically always the surgery of necessity. Likewise the presence of sepsis always increases the hazard in a case in which a surgical operation is to be performed. In a broad sense, therefore, if we accept the dictum that local is safer than general anesthesia, its use should offer us a means of meeting the demands here with greater safety, which becomes especially important on account of the inherent increased risk.

Disadvantages of the Method.—It must be admitted that the use of local anesthesia in abdominal sepsis presents certain disadvantages. Among the most important of these, speaking generally, is the increased likelihood of encountering psychic incompatibility, as it is well known that certain individuals develop an unfavorable mental attitude when afflicted with sepsis. Again the presence of sepsis offers locally a field which is decidedly more sensitive than normal, therefore demanding the most perfect anesthesia it is possible to obtain. Furthermore, the use

of local anesthesia restricts one's operative maneuvers to a certain extent to one particular area. Whether the latter factor is a disadvantage or not will depend largely upon circumstances. Our preference has been to curtail our operative work as much as possible in the presence of acute sepsis at least.

Advantages of the Method.—Some of the advantages (aside from its safety) of the local anesthesia method as we see them may be tabulated as follows: Speaking generally there is a lessened expenditure of physical energy and the liability to bodily trauma is reduced. There is a greater opportunity for retaining fluids within the system and the tendency to postoperative complications affecting the lungs, heart, kidneys and liver is decreased. Locally, there is a better opportunity to conserve energy and assist Nature by reducing manipulations and therefore local trauma. There is less tendency to soiling and less necessity for speed, allowing a more refined technique and more complete work. (As an instance of this latter point I might state that since our present technique has been perfected we have not failed to find and remove the appendix in every case of acute or subacute appendicitis in which we have operated.) However, in acute abdominal sepsis operating by the fractional method has found splendid application, the different procedures often being looked upon as minor operations without great objection on the part of the patient. After operation the principle of general and local rest may be carried out with more thoroughness when the method has been used. The manner of transporting the patient, the absence of nausea and vomiting, the exercise of the patient's self-control, all tend toward the conservation of vital forces. Locally, the added possibility of rest during the early postoperative hours is one of the most marked advantages. The reduction of the tendency of the intestine to travel into and away from the septic field after an operation under local anesthesia is without doubt of the greatest advantage to the patient.

The Manner of Applying the Method.—Following these generalizations it is my desire to illustrate in some detail the technique of the method as applied in the treatment of abdominal sepsis. Time will permit only the recital of a few general principles and perhaps the introduction of a sufficient amount of illustrative matter to make clear some of the important steps in the necessary strategy to be employed. It is hoped that in presenting these principles and details certain of the advantages mentioned above may be elucidated.

Former contributions have dealt with the extreme care with which patients should be handled when using the local anesthesia method and I can do no more than reiterate the admonition that in general the utmost caution should be used in handling the septic case before, during, and after operation, carrying out all of the details demanded by a simple case with a superlative degree of attention. Fluids, anodynes and

hypnotics, careful transportation to and from the operating room, as well as a refined operative technic are especially indicated.

The actual performance of an operation by the local anesthesia method in the presence of sepsis merits a more detailed discussion. One must bear in mind that in acute or subacute sepsis, at least, the patient may be in a highly nervous mental state and meet this condition by the judicious use of drugs, of which morphine is the most satisfactory. Most unfortunately this drug is often indicated for other reasons than the alleviation of nervousness and may thus be used for a two-fold purpose. One must not forget that every bodily movement may cause the patient local distress and that active or vigorous movements are often the means of disseminating septic collections to uncontaminated portions of the abdominal cavity. Again one must remember that it is quite impossible or impracticable to anesthetize completely the entire abdominal cavity by the means of local anesthesia and that when operating under this method one must most scrupulously avoid manipulations which transmit painful impressions to unanesthetized areas. Certain factors must guide one in choosing the form of local anesthesia technic to be used. The feasibility of changing the position of the patient upon the operating table must be considered. Paravertebral and extradural anesthesia are for this reason often contraindicated. One must so plan and conduct all procedures that all overt acts may be prevented and see that emergencies resulting from inadvertance are not allowed to convert a method chosen for its safety into one which is, if anything, more dangerous than the method for which it is a substitute.

It may be well to bring a fair proportion of these cases to the operating room fairly well narcotized, although this is by no means necessary in most cases. Direct infiltration or infiltration block along or near the line of incision is the method of choice. Every precaution is taken to inhibit entirely the muscular reflexes. Provision is made for tilting the patient into any desired position by means of the worm drive mechanism without delay, commotion, or added discomfort. Retraction of the elastic type is used. Perfect exposure and illumination are insisted upon, the cooperation of the patient is engaged and pressure and unnecessary traction avoided. Suction replaces sponging and the opportunity to reduce the spread of the septic process during and after operation, which the use of the local anesthesia method offers, is utilized to the fullest extent.

For the purpose of illustration it may be well to consider meeting the surgical indications of some of the various types of abdominal sepsis—acute, subacute and chronic, by the local anesthesia method. Obviously only a few leads can be presented, as a description of the method of treating even a small percentage of the septic conditions found within the abdomen is far beyond the scope of this paper.

For the purpose of illustration we may consider appendiceal abscess.

If possible the abscess is drained through an incision made through a directly infiltrated area. The vaginal, rectal or abdominal wall may be incised. In case the abscess is opened through the abdominal wall the gridiron incision is made and two pairs of number four retractors inserted. The pus is evacuated by suction and following this the appendix most carefully searched for. It will always appear in the wall of a primary abscess and when found, its base and mesentery may be clamped and ligated, or the clamps only may be applied and allowed to remain *in situ* for a day or two.

Should one find it necessary to traverse the free peritoneal cavity the following technic is to be recommended: The abdomen is opened as above and the retractors inserted, after which one leaf of the abdominal wall is gently but firmly elevated by means of a strong flat retractor, and a number of long narrow salt sponges inserted until the free cavity is completely protected. The wall adjoining the abscess is next elevated and a subperitoneal infiltration made along a line beneath which the adherent bowel is to be separated, after which the abscess is opened and dealt with. After evacuating the abscess the abdominal wall is once more elevated and the gauze packs withdrawn, in an order the reverse of that in which they were introduced. During this procedure the omentum will usually be attracted into the field and we advise anchoring it in the most protective position by means of a few catgut sutures. This technic may be applied to an abscess of any variety located within the abdominal cavity. It may generally be accomplished without pain and with the minimum hazard to the patient.

The silent field, the absence of visceral excursion and the avoidance of haste are marked attributes of the local anesthesia method during operation, but its greatest advantage presents during the post-operative period.

Thus after completing a most painstaking operation which offers to the crippled patient the maximum protection, both generally and locally, there seems to be no question that the conditions following an operation under local anesthesia leave the patient in the most ideal status to meet the indications. There is less depletion. The lungs are clear. The heart, liver and kidneys have been injured to a less degree. The patient is conscious and able to cooperate and thus can control bodily movement. Therefore there is no tossing about, no struggling, no accidental removal of dressings or drains, no inadvertent ingestion of food or of water. To my mind, however, the greatest advantage offered by the local anesthesia method in these cases relates to the actual field of operation. Visualize, if you will, the local conditions within the abdomen at the completion of a skillfully performed operation carried out along the lines detailed herein. Ordinarily with the viscera remaining in the exact relations in which they were left at the completion of

the operation only slight opportunity is offered for the spread of infection beyond the immunized field. The assistance required by Nature has been contributed with the maximum protection to the organism and the minimum of local and general trauma.

On the other hand, can we, when general anesthesia is used, feel assured that the viscera will remain in the approximate relations they occupied at the completion of the operation? Repeated vomiting and retching and even a moderate amount of bodily movement will have a tendency to carry infection from one part of the abdomen to another through the to and fro excursion of the small intestine and omentum. The assurance that one may, in a large percentage of cases, avoid or greatly reduce the chances of spreading infection is therefore considered of the utmost importance.

As an instance of acute abdominal sepsis perforated ulcer may be mentioned. The manner of handling these is extremely simple as a rule, under the local anesthesia method. Adequate blocking of the abdominal wall causes a most remarkable relaxation as well as a cessation of pain. Negative pressure is easily obtained. Finding of the ulcer is usually not difficult and the appropriate procedure may usually be carried out without adding general anesthesia. Acute appendicitis, cholecystitis and salpingitis are amenable to treatment by the same method.

More chronic conditions, where adherent masses are to be dealt with, may be found somewhat more difficult to manage and yet with perfect relaxation, proper tilting of the operating table, visualization, gentle severing of adhesions as they are encountered, and a utilization of the principle of releasing the pathologic masses before attempting to elevate them, it is surprising how much may be accomplished with local anesthesia in the treatment of subacute and chronic infectious processes.

In conclusion therefore, may I suggest that the many advantages of the local anesthesia method be more often offered to patients who are afflicted with abdominal sepsis, and in closing may I express the hope that the suggestions offered in this paper may aid others to some degree in coping with these problems which demand every artifice which surgery can produce.

THE TIME FOR OPERATION IN ECTOPIC GESTATION*

(A Preliminary Study of the Action of the Systolic Pressure in These Cases.)

BY THURSTON SCOTT WELTON, M.D., F.A.C.S., BROOKLYN, NEW YORK.

IT is not my purpose to reopen the debate regarding the advantages or disadvantages of the immediate or delayed operation in ruptured ectopic gestation. I wish to give a resumé of my records of the action of the systolic pressure in the various degrees of shock complicating ruptured extrauterine pregnancy, and to draw certain deductions from our observations.

For this purpose ectopics may be divided into four general groups:

1. Those cases in which a positive or tentative diagnosis of unruptured ectopic has been made. The patient is in the non-tragic stage. The systolic pressure is not affected.

2. (a) Those cases in which rupture or tubal abortion has occurred, not accompanied by shock. The systolic pressure shows a gradual decline.

(b) Cases of ruptured ectopic, with the patient in moderate shock. The systolic pressure ranges from 80 to 95.

3. Cases of exaggerated types observed in subheading "b" of Group 2. The shock is severe; the patient is often moribund. The systolic pressure ranges from 0 to 50.

4. Here the diagnosis is made from the history and at autopsy. The history is obtained from others than the patient. The patient suddenly felt a sharp, cutting pain in her pelvis, fainted, remained unconscious, and died before aid could be rendered.

The type of case most frequently seen is that of the patient in shock with a systolic pressure between 80 and 95. In the large majority of instances the blood loss is not proportionate to the degree of shock exhibited. It is not the amount of the hemorrhage, *per se*, that is responsible for the shock, but adjunct factors. We have noted this clinical fact many times at operation.

Under appropriate treatment—the usual measures employed are raising the foot of the bed, applying heat and abdominal compression, and administering morphine—the systolic pressure rises. Under favorable conditions the pressure reaches 105 to 115. It is very rarely that the pressure fails to respond under treatment. If the pressure is permitted to rise higher than 115 the sealing clot in the rent tube

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

THE LONG ISLAND COLLEGE HOSPITAL

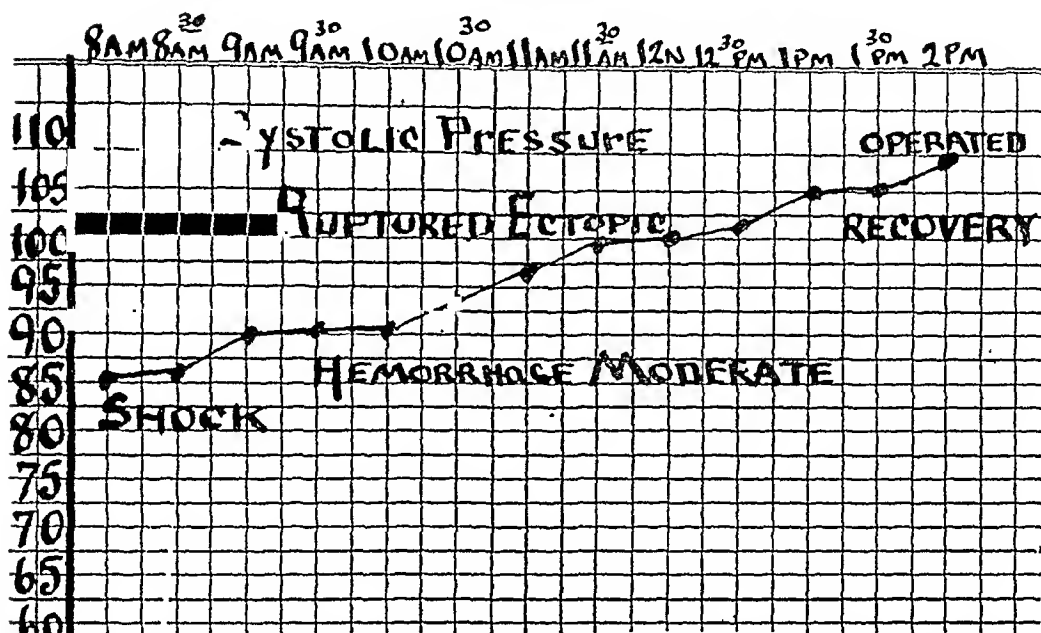


Fig. 1.—The usual picture of the systolic pressure in ruptured ectopic, in shock but with moderate hemorrhage. In six hours the pressure rose from 85 to 110. Operation was done with recovery.

THE LONG ISLAND COLLEGE HOSPITAL

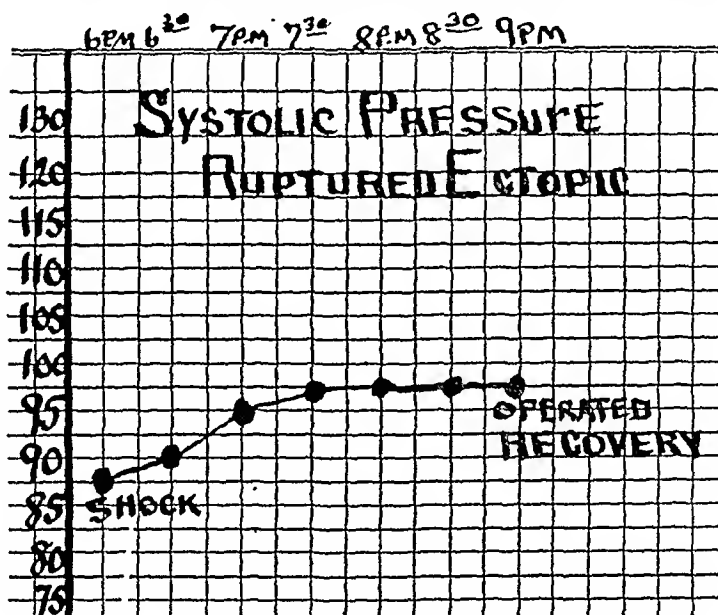


Fig. 2.—The pressure rose to 100 at which point it remained for two hours. Operation with recovery resulted.

THE LONG ISLAND COLLEGE HOSPITAL

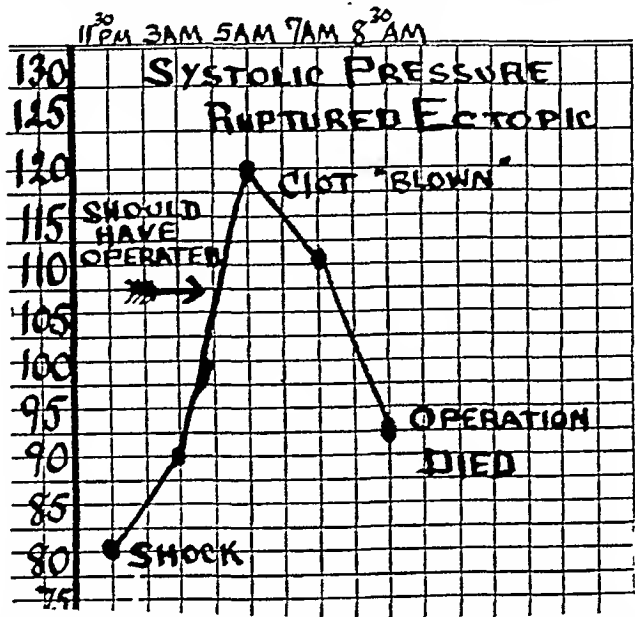


Fig. 3.—An example of permitting the systolic pressure to rise beyond 115. The sealing clot was disturbed, active hemorrhage followed. Death followed shortly after operation.

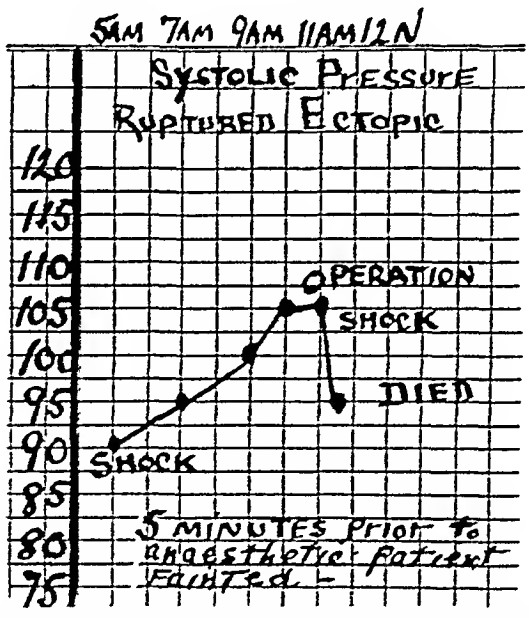


Fig. 4.—Patient in shock responded to treatment. With a systolic pressure of 105, she was sent to operating room. Five minutes prior to anesthetic she fainted, collapsed. Operation done immediately. Patient died at close of operation. She was operated upon while in shock.

may be disturbed with renewed hemorrhage and shock. When this occurs the pressure takes a sudden drop. It has been noted that the pressure will rise, in some cases, and then remain stationary. It is a fine point to determine how long to watch a patient with a stationary pressure; it is a good rule to wait not longer than two hours. A pressure will rise, reach its maximum point and then slowly begin to fall. This means a slight blood leak, the forerunner of what might be an excessive hemorrhage.

In the cases observed in Group 3 the patient is pulseless, her initial systolic pressure may be anywhere from 0 to 50, and she is in every sense moribund. The temptation is great to do something at once.

Under treatment the rise in pressure is never more than 20, in those cases in which the initial pressure read 50, or thereabouts. In the moribund cases, in which no systolic pressure can be elicited, only under the most favorable conditions will the pressure rise to 45. But we have noted that after even a slight rise in pressure the patient is in an improved condition, and although not definitely in the non-tragic stage, is not in the severe state of collapse when first observed. Even after a rise in pressure these patients are poor operative risks. Many who survive the operation do poorly postoperatively, and succumb from a variety of causes.

As recorded in the pressure findings in Group 2, the pressure in these cases may rise to remain stationary, or rise and then begin to decline.

Unlike the majority of reporters we do not operate upon any patient immediately, if in the tragic stage. By "we" I mean the group in Dr. J. O. Polak's clinic, Dr. H. B. Matthew's clinic, and Dr. C. A. Gordon's clinic. I quote these workers as they are in our personal group. We continue to practice the so-called "delayed operation" for the simple reason that it has given excellent results.

We do not sit by and watch the patient's life ebb away, as described by so many writers. Instead we use the familiar measures to combat shock, and carefully follow the findings. Blood pressure, hemoglobin, and pulse readings are frequent and the rule. This waiting is not a matter of days but of hours.

In the cases common to Group 2 we wait until the pressure has reached 105 to 115. To us this means the woman is in the non-tragic stage. It has been found dangerous to permit a further rise in pressure as the clot is pushed loose and further hemorrhage ensues. A falling systolic pressure in a patient not in shock means hemorrhage and immediate operation is our procedure.

A pressure that rises and then remains stationary calls for clinical judgment. How long shall we wait? It is a safe workable rule to wait about two hours, and if there is no further rise in the pressure, operate.

THE LONG ISLAND COLLEGE HOSPITAL

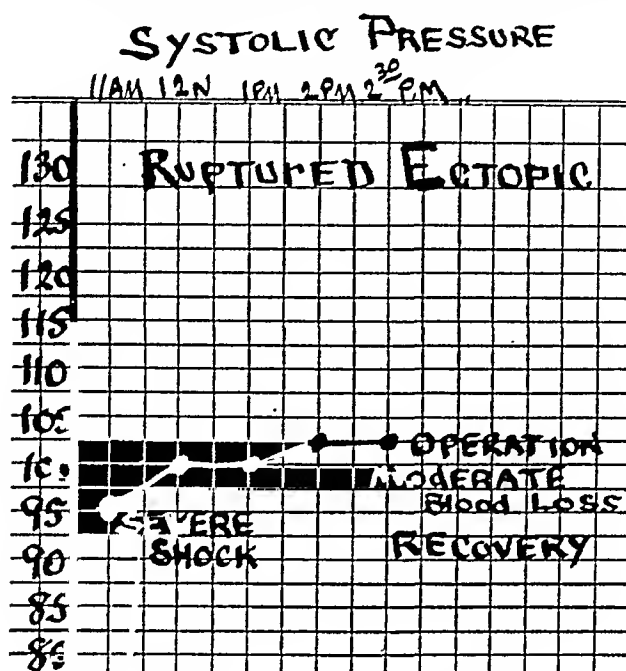


Fig. 5.—Patient severely shocked. Moderate blood loss. Patient not in tragic stage at time of operation.

THE LONG ISLAND COLLEGE HOSPITAL

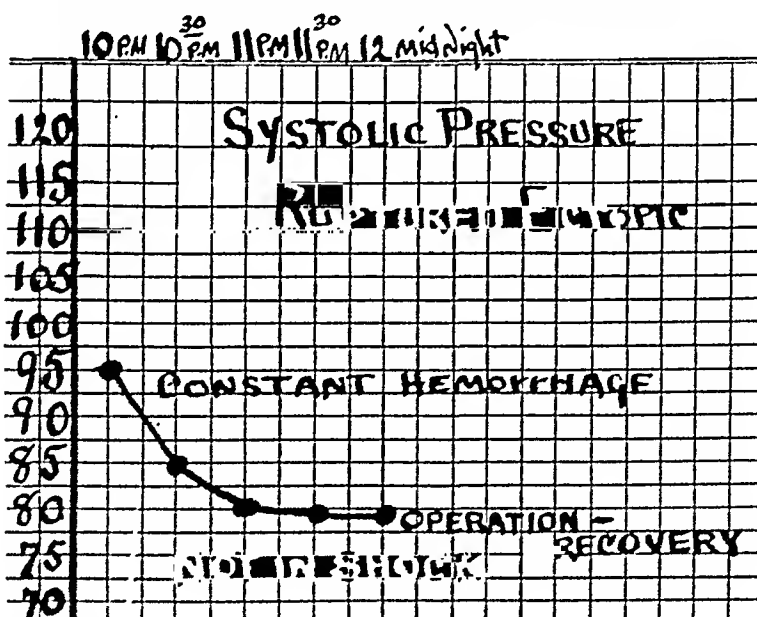


Fig. 6.—A diagnosis of unruptured ectopic pregnancy was made in a physician's office. After entering hospital rupture must have occurred. There was no shock. The systolic readings showed a steady decline. Operation was done with recovery of the patient.

Likewise, in a pressure that rises and then begins to fall, immediate surgery is our custom.

In cases of the type in Group 3, it is not safe to wait two hours in a pressure that remains stationary after a persistent rise. Operation without delay is paramount. In a pressure that rises and then begins to fall, immediate operation should be done.

From clinical observations in ruptured ectopic certain postulates can be enumerated:

1. A woman with a ruptured ectopic either dies almost immediately, before aid can be rendered, or remains in a state of shock often amenable to treatment.

2. Some die not of the hemorrhage, but of the shock which follows the hemorrhage.

3. Shock with a systolic pressure of 90 or above is often the result of the injury and not the amount of hemorrhage which has occurred.

4. A patient moribund, with a systolic pressure of 50 or lower has had excessive hemorrhage in addition to the injury.

5. If a patient does not die at the time of the initial rupture, but responds to proper treatment, the point of rupture has sealed itself and hemorrhage is checked.

6. Treatment will aid in overcoming the state of shock to a certain degree, and so make surgery a safer procedure.

We believe a misunderstanding is the cause of much debate regarding the time of operation—early or delayed. Many men claim they operate early, the patient is in severe shock, when, as a matter of fact, they do no such thing.

We have studied records of such types of cases. For the most part they are without scientific value. An example will suffice for all.

A woman is brought to the hospital, and the interne or resident makes a diagnosis of ruptured ectopic. The patient is in a state of shock; the usual work-up is attempted. The history is obtained from a relative or friend; the pulse, temperature and respiration are recorded. Also, is recorded on the chart the hemoglobin, a differential blood count, and the blood pressure. The patient is placed in the Trendelenberg position, heat applied, morphine administered and the attending surgeon is notified. He responds to the call—sometimes half an hour, or an hour and a half later. He examines the patient and accepts the interne's or resident's findings, the operating room is prepared and operation is done. Prior to operation no further hemoglobin or pressure readings are taken; the woman recovers. The case is recorded as one operated upon while in the tragic stage. Who knows but what in the interim between the first pressure reading and the time of operation the shock did not abate, and the patient passed from the tragic to the non-tragic stage? Surely such a case is without value for study.

THE LONG ISLAND COLLEGE HOSPITAL

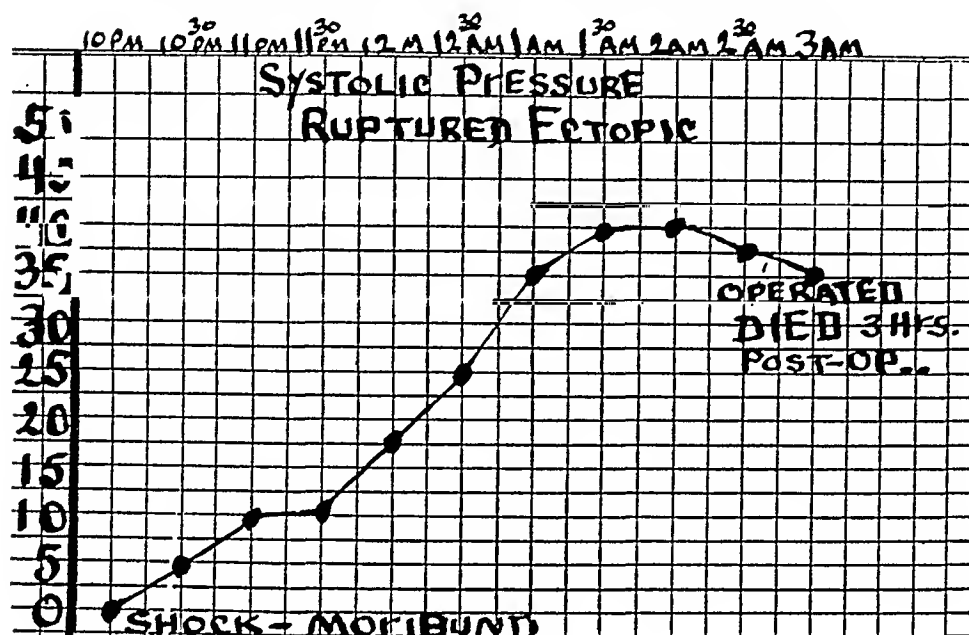


Fig. 7.—This is an extreme example of a ruptured ectopic, pulseless and moribund. She reacted to treatment. The pressure rose from 0 to 40, then began to fall. Operation was hastily done. Patient died three hours postoperative.

THE LONG ISLAND COLLEGE HOSPITAL

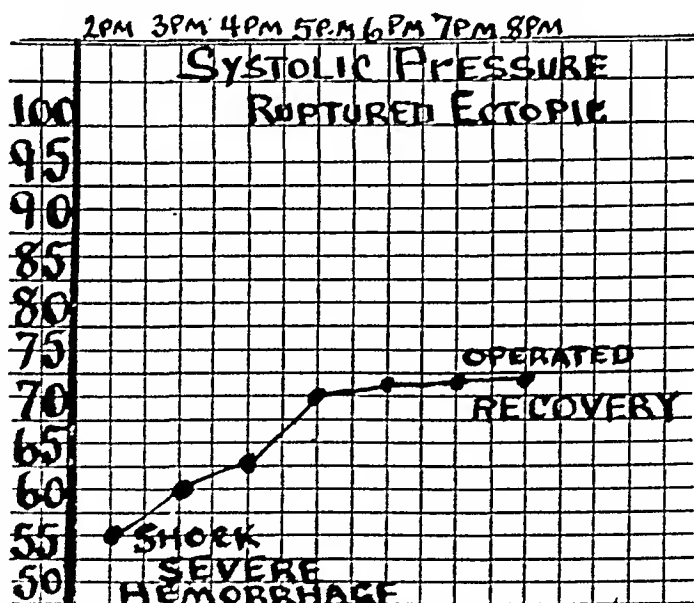


Fig. 8.—This patient was in severe shock. Operation revealed the hemorrhage was excessive. She responded, as shown by the systolic pressure chart, to treatment, and was operated upon with satisfactory results.

Which brings us to the observation, based on a study of hospital records, that too little work is attempted in these cases. We hear much talk about repeated pressure readings, but few practice what they preach. Until frequent, systematic pressure readings are done, hemoglobin percentages obtained, and the pulse recorded, we will have clinical reports of no practical worth.

CONCLUSIONS.

1. One gains nothing by operating while a patient is in shock.
2. If a patient does not die at the time of her initial collapse, it denotes she will respond, to a certain degree, to measures in treatment.
3. All ectopics in shock should be given a trial to demonstrate what they can do by way of a recovery. This is well shown by systolic pressure readings.
4. In all unruptured ectopics surgery is the rule.
5. In a pressure that continues to fall, in spite of treatment, surgery is imperative.
6. In a pressure that reacts to, at the maximum, 115 operation is indicated.
7. In a pressure permitted to return to normal limits the sealing clot may be disturbed and renewed hemorrhage and shock occur.
8. In the moribund type of case, with an initial pressure of 50 or lower, the rise, under treatment; is never back to normal limits.
9. A pressure that rises and then remains stationary calls for surgery. The time we wait while a pressure remains stationary depends upon the type of case, and is governed by the experience of the operator.
10. Any pressure that rises and then begins to fall calls for immediate surgery.
11. The action of the systolic pressure is a good index of the patient's condition.
12. Records, to date, are for the most part unreliable, as inadequate clinical data have been recorded.

BLINDERS WANTED IN SURGERY*

BY ROBERT T. MORRIS, M.D., F.A.C.S., NEW YORK, N. Y.

THE third or pathologic era of surgery emerging from the second or anatomic era possessed the vices of its virtues. The eagerness of the surgeon to dispose of bacteria and their products allowed him to forget the patient. His interest was centered more distinctly upon a newly acquired art based upon a fascinating revelation in science that related to the microbe and its works.

When we opened the abdominal cavity it seemed desirable to "expose all of the pathology" according to a colloquialism which became current and like many other phases ran a malignant course. We forgot what a patient might do with his own internal resources and we deliberately and conscientiously set to work to remove bacteria and their products from the peritoneal cavity. Now if we stop to think for a moment and if in addition to thinking we try out the practical plan of pouring a pint of milk into the peritoneal cavity and then try to wash it or wipe it out we shall be brought face to face with a realization of the fact that we are washing or wiping the patient's life away with no possibility of our getting the last drop of milk that is spread over the peritoneum.

If we remember further that pus in the peritoneal cavity is frequently sterile or nearly so and that bacteria are at work in the tissues rather than in the pus itself we shall be pleased to remember what we already know. It was this matter of "exposure of all pathology" under the protection of aseptic methods of work and of kindly anesthesia which allowed the surgeon to see too much. It introduced the need for the use of blinders in surgical work. Some of our patients with appendicitis abscess recovered without surgical operation at the hands of old-time physicians who did not believe in operations for this disease. The mere fact of recovery of a single one of these patients called for explanation. Having arrived at this explanation we were then in a position to see if some principle could not be evolved which would be applicable for more cases of the same sort, in whole or in part. As a matter of fact the surgeon's work in these cases consisted in his becoming a diplomat and making compromise between Nature's methods and his own skillfully applied art.

The surgeon who employed the testimony furnished by the recovery without operation of an appendicitis patient with abscess and who

*Read at the Thirty-sixth annual meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1922.

carried this up to the fixed point of a new principle found himself born into a new era in surgery. The new era was the fourth or physiologic era of surgery. In this era the patient was given "home rule," in other words is turned over to his own natural resources with the least degree of surgery which will suffice for that purpose.

During the height of development of the third or pathologic era (the surgeon seeing too much and needing blinders), appendicitis patients with wide infection were being treated in Boston by multiple incisions and extensive use of gauze drains inserted between loops of bowel, after removal of pus or infected peritoneal content. In Baltimore at the same time patients were actually being eviscerated for the purpose of allowing a thorough wiping, washing and otherwise cleansing of the peritoneum. In New York at this same time patients of the same sort were being treated with short incision, rapid operation with insertion of a small drain and then the application of the Alonzo Clark opium treatment in cases in which that was desirable.

As an advocate of this fourth or physiologic era in New York I found it difficult to obtain a hearing. Statistics were questioned. It was believed by some that cases selected with a view to favorable report had been used for statistics. There is always somebody who knows. It is this "somebody who knows" who brought about a compromise between methods employed in Boston, Baltimore and New York.

At the J. Hood Wright Hospital in New York where surgeons who "saw too much" in appendicitis cases with complications had a death rate of 31 per cent, Dr. L. W. Hotehkiss was the first to make a complete abrupt change over to the fourth or physiologic era in surgery. He then had a run of 76 appendicitis cases without a death, these cases being of the same sort as those which previously furnished a death rate of 31 per cent by third era methods.

Pyosalpinx furnishes another object lesson for contrast between the methods of the third era and fourth era of surgery. According to methods of the third era, when surgeons "saw too much" of ragged adherent tubes with dammed pus and often with other abscess formations in the pelvic cavity they did devastating work by removing the damaged tubes and ovaries. They did not stop to remember that a testicle and epididymis, the site of acute orchitis, would have presented quite as bad looking a spectacle had it become the custom to cut down or remove such testicles as promptly as ovaries and tubes were being removed. Men objected to testicles being cut out. Women did not seem to mind losing their ovaries and tubes. Some third era surgeons in addition to removal of ovaries and tubes went still further, and said that the uterus being infected, and of no further

service might as well be removed also, making a clean job of the whole thing. Fourth era surgeons did nothing of the sort. They taught that infected tubes freed from adhesions should be split open lengthwise, sutured to the anterior abdominal wall and then allowed to drain externally while the patient was being treated with vaccines. Hygroscopie and astringent tampons were at the same time to be employed in the vagina.

At the end of some weeks or months when the patient had quite recovered from infection a small secondary operation would suffice for freeing the tubes which had been fastened to the anterior abdominal wall. At the time for this secondary operation it was sometimes found that the tubes had freed themselves, that tubes which had been split wide open in their entirety had not only become round again but that fimbriae had developed where no fimbriae were to be detected at the time of the original operation. Pyosalpinx then furnishes one of the best object lessons in relation to the need for the wearing of blinders by surgeons of the third era who have not moved up to the principles of the physiologic era of surgery.

Typhoid perforation of bowel or acute perforation of gastric ulcer allow still further striking contrast between the methods of the two eras.

In acute perforation cases third era surgeons felt that they must open the abdomen widely, wash or wipe out escaped visceral contents and then do an ideal operation by closing the perforation for patients who were in no condition to bear any such attack of surgery at such a time.

The fourth era surgeon, on the other hand, in cases of acute visceral perforation, makes a very quick operation, sometimes with local anesthesia only and through a small incision introduces a drainage device. He then places the patient upon treatment which will conserve natural resources, postpones the time for an "ideal operative procedure" to a time when the patient is in condition to stand up under such an attack and this time in fact may never come. In some cases a good recovery occurs under the guidance of the patient's own protective resources.

Even in the simple matter of wound dressings the difference between third era methods and fourth era methods would seem to indicate that blinders would often be desirable. One who observes the house staff or the nurses of a hospital washing and wiping pus away from a wound, sometimes even going to the extent of using the injurious peroxide of hydrogen, will be impressed by the fact that new repair cells are being sacrificed upon the altar of the idea of gross cleanliness.

Wounds undergoing repair are seldom to be washed or wiped. They are to be treated by dressings which will absorb and spread discharges

safely. Every care is taken to avoid injuries to new repair cells with germicides or with irritating dressings.

Blinders are wanted for nurses and assistants in the daily round of new dressings quite as much as they are wanted where third era surgery allows the operator to see too much.

114 EAST FIFTY-FOURTH STREET,

(For discussion, see page 216.)

THE USE OF X-RAY THERAPY IN DISTURBED MENSTRUATION*

BY A. J. RONGY, M.D., NEW YORK CITY

THE efficacy of x-rays in the treatment of fibroid tumors of the uterus is well-nigh established; in fact, there are gynecologists who advocate x-ray therapy in all forms of fibroid tumors of the uterus. While I do not hold such views, still I believe that x-ray therapy should be employed for patients suffering from fibroid tumors of the uterus, in whom there is a contraindication for operation. Patients, suffering from uterine fibroids, who have organic lesions of the kidneys, or who suffer from circulatory disturbances, or who are not good operative risks because of the location of the tumors, should not be subjected to surgical operation. Our statistics for hysterectomy will greatly improve if we eliminate those patients who are considered poor risks even by the most expert surgeon.

In reviewing my own statistics of uterine fibroids for the past three years, I find that in nearly 30 per cent of the patients I advised against surgical interference because of some definite contraindication and treated them with deep x-ray therapy. Invariably, good results were obtained; that is, the bleeding was controlled and the pain diminished. In only four patients was I compelled to remove the tumors, because the bleeding returned after it had stopped for nine months or longer. One patient bled so profusely that she became exsanguinated, and I had to resort to a number of transfusions before I operated on her.

It was Lengfellner, and later Halberstadt, who first demonstrated the greater sensitiveness of the ovary to the rays; and that menstrual changes are produced by radiation of the generative organs. This led to the use of x-ray in the severe types of dysmenorrhea in order to stop obtaining the cessation of the menstrual function completely.

It is now not uncommon to utilize the rays for the purpose of producing temporary or permanent sterility, especially in patients in whom

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

there exist definite contraindications for pregnancy. Such patients are very often spared the ordeal of a surgical operation.

When the effect of the rays upon the ovaries was fully established and its use to stop the function of menstruation was universally adopted, some investigators gradually extended its use to milder forms of menstrual disturbances and, by developing a finer technic for its application, have succeeded in modifying some of the so-called functional menstrual disturbances, like menorrhagia or even metrorrhagia, in women between the ages of twenty-five and thirty-five years.

During the past year I had a most striking experience of the effect of radiation in a case of prolonged meno- and metrorrhagia:

Mrs. S. B., thirty years of age, had been married nine years, was never pregnant. For seven months she was spotting and staining irregularly; five days was the longest interval that she did not stain or spot. Vaginal examination disclosed no abnormalities of the genital tract; the uterus was normal in size, shape, and position, but of a somewhat hard consistency. She was curetted after she had bled for four months, but was not relieved. The bleeding still continued and she was advised to have a hysterectomy.

She came to see me after she had been bleeding for seven months. I suggested to her that, before she decided to have a hysterectomy performed, she should give deep x-ray therapy a trial and that, if the bleeding still persisted, she could always have the uterus removed. After four applications of the rays the bleeding ceased and the menstrual flow did not appear again. Four months later she called again and upon examination I found her two months' pregnant. The pregnancy continued normally and she was delivered spontaneously of a living male child, weighing eight pounds four ounces.

How the rays acted in this case I do not know, and I believe the most learned of physicists would find it difficult to explain.

As experience with x-ray therapy increased, it was found that the effect of the rays upon the ovarian tissues differed, that their action depended to a great extent upon the mode of application and the dose administered; that a massive dose highly concentrated would destroy the ovarian cells, and that a smaller dose would only modify the function of the ovarian cells. Furthermore, a very small dose, properly applied, would in some instances stimulate the ovarian cell and even cause greater proliferation. This led to the idea of the use of stimulating doses of the rays in menstrual disturbances, which are supposedly caused by deficient ovarian secretion.

Clinically there is a definite group of patients, who are classified under the heading of ovarian dysfunction. They menstruate once in two or three months; the flow is scanty and lasts but a day or two. These patients are usually sterile and some form of cystic degeneration, both macroscopically and microscopically, has taken place in such ovaries, with the result that there is not a sufficient quantity of ovarian structure left to carry on the function of menstruation properly.

Such patients usually tax all the resources of the gynecologist. We have very little at our command which will help to cure these cases. Occasionally some combination of organic extracts will help to improve the menstrual function, but the improvement is temporary only. Tonics and regularly prescribed exercises sometimes help the anemic and chlorotic women, but as a rule these patients do not improve and menstrual function remains the same.

During the past year I selected a number of patients, who suffered from irregular and scanty menstruation, and referred them to an expert radiologist, Dr. I. S. Hirsh, of Bellevue Hospital, for stimulating doses of x-ray. Every patient was carefully examined by me, and the findings of these cases were sent with the patient. I believe this is necessary, for it is important that the radiologist should have a proper conception of the condition of the genital organs before he institutes treatment.

It is difficult to convince patients to take this treatment, because they fear it will stop their menstrual function; in fact, they are so told by their family physicians. However, I succeeded in convincing thirteen patients that no harm would result to them from this treatment. I must admit the radiographer and I were not too enthusiastic about it. It was still an unexplored field, especially in this country; only a few scattered reports appeared in the literature of favorable results obtained by this method of treatment. Fortunately the result obtained in the first patient warranted a further trial of the treatment.

This patient was twenty-one years of age, married four years, and began to menstruate at fourteen, every month, four to five days' duration. At the age of sixteen she began to menstruate every two or three months and gained a great deal of weight. She came to see me February 7, 1923, giving a history of menstruating last, on December 5, 1922, and before then in August of the same year. After four treatments she menstruated February 13, for three days, and had no pain. She menstruated again March 21, for three days, and the flow was more profuse. Since then she menstruated regularly every five or six weeks.

The second patient did not respond to the treatment.

The third patient reacted well. She was thirty-four years of age, married nine years. She was sterile for five years, then became pregnant, and I delivered her of a living baby four years ago. She consulted me October 25, 1922, because she had not menstruated for one year. I gave her the organic extracts in various combinations, but they did not benefit her. On February 19, 1923, she called to see me again, as she still did not menstruate. I then referred her for x-ray and after two treatments she began to menstruate. The menstrual flow reappeared March 29, and lasted until April 3, and she has menstruated regularly since then.

Case 4 did not respond to treatment.

Case 5, Mrs. A. B., twenty-seven years old, had been married three years, and menstruated regularly every month, five days' duration. She became pregnant two and one half years ago and aborted at the end of the third month. She came to see me March 26, 1923, with the history that she had not menstruated since August 21, 1922, five days' duration. She was treated a number of times for about two

weeks. She menstruated twice at regular intervals, subsequent to the treatment, and we have not heard from her since.

Caso 6 did not respond to treatment.

Case 7 presented an unusual history: She was twenty-four years old, married four years, and began to menstruate at fourteen, irregularly, every two to four months for two or three days. For eighteen months prior to her marriage she did not menstruate. Menstruation reappeared, soon after she married, at irregular intervals of two or three months. She came to see me March 14, 1923, giving a history of having not menstruated in four months. Vaginal examination revealed a normal vaginal vault, the cervix conical and small, body of the uterus not well developed and of a hard consistency, the right ovary prolapsed and tender, and the left ovary apparently normal. On June 28 she wrote to me as follows: "I am writing to let you know that my monthly period appeared on May 29, and I had it again on June 23, three days each time. I have a great deal of pain in the abdomen and back for three days before the flow appears." She came to see me again on August 20, and said that she menstruated regularly every twenty-eight to thirty-one days.

Case 8 did not respond to treatment. This patient is twenty-nine years old, had been married two and one half years, and never pregnant. She began to menstruate at fourteen, every two or three weeks, at the age of sixteen the menstrual flow began to appear every three or four months. After her marriage she became still more irregular, and at one time she did not menstruate for six months. Vaginal examination disclosed underdeveloped genital organs.

Case 9, Mrs. F. K., twenty-one years old, had been married three years, had a baby at full term two years ago, which died of spinal meningitis at the age of eighteen months. On January 18, 1923, I saw her in consultation. She gave a history of having menstruated nine months ago, and both the patient and her physician thought she was pregnant and due to be delivered in February. Upon examination I found the uterus small and easily palpable, and there were no signs of pregnancy. On February 26, she was spotting and staining two days, and again on May 3 she spotted for a day or so. She called to see me May 26, and I advised her to be treated by radiation. After receiving two small doses of x-ray, she began to menstruate regularly. She last reported July 28, stating that she had menstruated regularly twice after the radiation.

Case 10 did not answer to our many inquiries. In Case 11 no result was obtained. Cases 12 and 13 did not respond to treatment, but in case 13 the treatment has been given too recently to form final judgment.

As will be seen from the above, five patients have definitely improved under this form of treatment, the menstrual function having been reestablished, and is normal as to time and duration. One patient had not menstruated 18 months prior to the treatment.

I believe these results warrant the use of stimulating doses of x-ray therapy in patients who suffer from menstrual irregularities caused by ovarian dysfunction. The cases must be carefully selected by the gynecologist and the treatment must be given by an expert radiologist. I am certain that our next series of cases will show better results, because the radiologists will learn to gauge the dosage and mode of application much better to suit the individual case.

LESIONS OF THE CERVICAL STUMP OF A SUPRAVAGINALLY ABLATED UTERUS*

BY FRANCIS REDER, M.D., ST. LOUIS, MO.

EVERY surgeon in exercising the conventional conservatism in his operative work, a dictum in surgery that must command the respect of every hand that wields the scalpel, should be properly cognizant of the consequences his conservatism may levy upon the future welfare of his patient. There are instances in the surgeon's work when conservatism practiced to the best of his ability may prove the worth of his wisdom, and again there may be instances when such conservatism may disprove the erudite conceptions of the operator.

In giving expression to these sentiments I have in mind that anatomically insignificant part of the uterus, known as the portio vaginalis. What this neck-like portion of the womb lacks in anatomic importance is wonderfully compensated for by its physiologic function.

When in a state of health, the "portio" is perhaps the least considered anatomic structure in the body, but when diseased its pathology arouses an interest of the keenest nature. And it may well be so, for the convincing evidence is clearly shown in the fertility of its soil for malignancy. Although other diseased conditions depicting features of an infectious process either acute or chronic, such as follicular or papillary erosion, hypertrophy and hyperplasia, cervical endocervicitis with its resultant cystic degeneration and the sequential ectropion of a childbirth trauma, constitute concrete clinical entities of pathogenic potentialities, none of these conditions, however, presents the grave aspect of cancer of the cervix.

There is no doubt that the enumerated lesions initiate a cervical malignancy whenever the biogenic balance becomes sufficiently disturbed. In these instances the solution of anticipating the development of a cancer by instituting the proper measure for a cure, is clear.

During the past year my thoughts have been stimulated by a subject that has found rather decisive expression in the valid opinions of Dr. J. O. Polak, viz.:—the total removal of the uterus instead of a supravaginal amputation in cases of a myomatous growth in the body of that organ.

I have met with three cervical stump lesions demanding removal during the past year. Two were cancer and one a myoma of the cervix. Of the malignant cases the patients were respectively fifty-eight

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

and sixty-two years of age. In both patients a supravaginal amputation for myoma was performed. In the patient fifty-eight years old the uterus was ablated supravaginally eight years ago, and in the patient sixty-two years of age, seventeen years ago.

The patient with the cervical myoma was thirty-six years old. Three years after an operation for a uterine fibroid in which the supravaginal amputation was performed this patient presented herself with a cervical myoma of the posterior lip the size of a billiard ball.

Dr. Polak supports his argument by referring to a number of cases of cancer developing upon the remaining cervix years after the primary operation had been performed. It is reasonable to assume that such an argument is deserving of serious consideration. When it is a known fact that cancer of the cervix is a very common disease, that it is more frequent even than cancer of the breast, and is the chief cause of the greater prevalence of cancer in the female than in the male, there remains the inference that a total removal of the uterus would be the proper procedure whenever a myoma of the uterine body demanded removal of the abdominal portion of that organ.

Such a procedure has its appeal and no doubt meets the approval of the surgeon in cases where the cervix gives evidence of disease, or in a subject that presents a predisposition to cancerous disease, as may be elicited from the family history.

That the operation of total hysterectomy for a myoma of the body of the uterus, the cervix being healthy, will ever meet with general approval, must be doubted.

There are objections to a total ablation, and although these objections may be responsible for a disaster in the future, a situation that will, however, always be problematic, they serve at least for the present a highly satisfactory reason for not sacrificing the entire organ in some cases of uterine myomata.

Operation for uterine tumor is today performed by every casual operator, and of casual operators there are many. When I look back upon my hospital interne days and recall the keen spirit and steeled tension the master surgeons evidenced when about to perform a hysterectomy, I cannot wholly suppress my feelings at the indifferent attitude taken by many operators of today, who in an apparently nonchalant manner undertake to perform this operation.

We can be assured with convincing certainty that, under the circumstances, a routine complete hysterectomy would show a rise in the mortality rate, and the number of nonfatal injuries to the bladder, ureter and rectum would be proportionately increased. In the less complicated cases a hysterectomy may, even in the hands of the average operator, be not difficult to perform, but frequently perplexing

situations are met with which demand the skill of a finished surgeon for their safe elucidation.

To those operators whose sense of timidity would deter them from performing a total hysterectomy when the indications are clear, a thorough familiarization with the excellent technique of Drs. Noble and Baldwin, if not already known to them, will prove of great advantage.

Although pronounced vaginal prolapse has seldom manifested itself after entire removal of the uterus, it does occur in a mild degree in many of the cases. This condition must be attributed to the lack of support from the intrapelvic structures that have suffered through complete hysterectomy. In a supravaginal hysterectomy a healthy cervix serves excellently as a support for the fixation of the round and broad ligaments, thereby maintaining the almost normal stability of the vaginal canal.

With the ablation of the entire uterus there must occur vaginal shortening. In a woman whose sex life is extinct, such a condition would be of little weight when advanced as an argument against total hysterectomy; in a woman, however, who is still in active sex life due consideration should be given to this state, and unless the cervix is extensively diseased, a supravaginal amputation should receive preferment.

It may not be pertinent to speak of infection in connection with total hysterectomy, when performed for a myomatous condition, but recently a very careful surgeon suffered the loss of two patients through infection following this operation. The origin of infection after a hysterectomy will always remain more or less in doubt; however, if the ablation has been complete the suspicion regarding the origin of infection will undoubtedly be cast upon the vagina. The cleansing of the vaginal canal may have been most thorough at the beginning of the operation; however, the fact must not be overlooked that contamination with infectious material from the uterine cavity may take place during the progress of the operation. It is one of the uncertainties occasionally encountered in this character of operative work, and its potentiality must be considered a salient feature in deciding upon an operative course which will present the greatest measure of safety. Here again it would appear that the best interests of the patient could be served by allowing the cervix, if not diseased, to remain.*

Whenever circumstances demand the removal of the uterus for a myomatous growth in which the question of cervix retention is being

*I do not wish the inference to be drawn from this assertion that infection may not occur through retention of the cervix. On the contrary, it may happen; however, it is reasonable to assume that a supravaginal amputation would greatly diminish this danger.

considered, the suggestions which occur to me in connection with this subject are the following:

If the patient's family history shows the presence of malignancy the assumption of the inherited tendency of a constitutional predisposition will be sufficient cause for a total hysterectomy. In those cases of cervical lacerations that have developed an extreme ectopic condition a complete ablation of the uterus should be undertaken.

Patients with a cervical disease amenable to a plastic operation, and still in active sex life, should be subjected to supravaginal section as the preferable operation. In these cases a simple but thorough plastic should be performed on the cervix, sufficient in scope to remove all of the diseased tissue. Special precaution, however, should be exercised in equalizing the wound surfaces created by the wedge shaped excisions, so that a good apposition of the newly formed lips may be obtained. Such a cervix after healing is perfectly smooth and healthy in appearance, and what remains of the cervical canal is almost completely obliterated. The removal of the cervical tissue should be as extensive as is consistent with the judgment of the surgeon, inasmuch as it is presumed upon histologic grounds that the removal of a large amount of glandular portions of the cervix proportionately diminishes the chances of subsequent carcinomatous degeneration.

I prefer this procedure to the "cupping out" of the cervix practiced by Kelly of Baltimore, or the intracervical enucleation of Lahey of Boston (*Annals of Surgery*, July, 1923).

The cervical plastic requires but a few minutes for its execution. The operation is a minor procedure and should not react severely upon the general condition of the patient.

Cancer of the cervix is extremely rare in virgins. In consideration of this fact the weight of opinion should favor the retention of the cervix whenever circumstances demand an operative procedure for a fibroid uterus. If the patient is still a young woman an appreciable service will be rendered her should she ever enter into wedlock. In explanation of this latter remark I have reference to the vaginal shortening which results from the employment of complete hysterectomy for these lesions. The partial obliteration of the function of this canal may not be inconsistent with a good degree of health and comfort; it however, may evidence its shortcomings under different conditions.

Ever since Dr. Polak has agitated this subject of stump cancer so forcibly, my examination of the cervix in a patient to be operated on for a uterine fibroid has been more searching and minute. If lacerations are present they are thoroughly scrutinized, for it is well known

that a hidden cancer nidus may readily find concealment in a fissure and easily escape detection.

When it is known that cancer is five times more common in women who have fibroid tumors than in women who do not have them, the position of the surgeon becomes vested with more than a passing responsibility. Upon his understanding the future welfare of such patients must repose.

UNIVERSITY CLUB BUILDING.

(For discussion, see page 218.)

FURTHER OBSERVATIONS IN RENAL GLYCOSURIA OF PREGNANCY

BY HENRY SCHNEIDERMAN, A.B., M.D., KANSAS CITY, MO.

THE discovery by Frank and Nothman¹ of a lowered carbohydrate tolerance during pregnancy and their utilization of this fact as a test for early pregnancy has aroused, within the last three years, great interest in pregnancy glycosuria.

The etiology being obscure, various hypotheses have been suggested. Nürnberger's² idea of calcium causing a thickening of the kidney epithelium cells, and thus preventing the colloids from filtering through, was not substantiated by his own experiments in which large doses of calcium failed to inhibit pregnancy glycosuria. Because slightly positive glucose reactions have been found about menstruation, and because the abnormal lowering of carbohydrate tolerance found during the first three months of pregnancy disappears in the later months, it has been suggested that the corpus luteum might be the cause of the lowered carbohydrate tolerance. The fact that in from one to ten days following abortion, where no placental tissue or products of gestation have been left, the glucose test becomes negative and vice versa, suggested the possibility that the chorionic villi or syncytium play some part in producing glycosuria during pregnancy. Frank and Nothman, who first suggested that pregnancy glycosuria was of the same nature as renal glycosuria, naturally believe in a lowering of the kidney threshold for glucose as the cause for the glycosuria in pregnancy.

In a previous communication³ while reporting some observations on the inhibitory effect of atropine sulphate and oxygen on renal glycosuria, I suggested that pregnancy glycosuria, having all the ear marks of renal glycosuria, might have the same etiology, namely, a disturbance in glycogenesis caused by an inhibition of the vagus nerve endings. A recent study of three cases of pregnancy glycosuria enabled me to repeat my former experiments and throw additional light on the possible etiology of renal glycosuria.

CASE 1.—Mrs. E. W., 28 years old, gravida i. A routine examination during the fifth month of pregnancy revealed 0.4 per cent glucose. Her past history except for childhood diseases was negative; urine examinations before pregnancy were always negative for sugar.

Following a night's fast this patient received 100 gm. of glucose. Whereas the fasting urine contained 0.1 per cent glucose the three hour urine following the glucose ingestion contained 0.7 per cent. The blood sugar values were as follows:

Fasting	67 mg. per 100 c.c.
One hour after glucose	100 mg. per 100 c.c.
Two hours after glucose	90 mg. per 100 c.c.
Three hours after glucose	83 mg. per 100 c.c.

The following morning this patient was given 1/100 gr. of atropine sulphate hypodermically, and five minutes later 100 gm. of glucose. The three hour urine contained the same 0.1 per cent glucose as the fasting urine. The blood sugar findings were as follows:

Fasting	93 mg. per 100 c.c.
One hour after glucose	107 mg. per 100 c.c.
Two hours after glucose	116 mg. per 100 c.c.
Three hours after glucose	107 mg. per 100 c.c.

The next day she walked for thirty minutes right after the ingestion of 100 gm. of glucose. One hour after the ingestion of the glucose the urine was free from sugar. The 0.1 per cent glucose present in the urine before the experiment was started, had disappeared. Two hours later, however, the urine contained 0.4 per cent glucose. In order to determine if the temporary disappearance of the glucose following the walk was due to an increased intake of oxygen as pointed out in my former communication,³ the patient inhaled pure oxygen right after the ingestion of 100 gm. of glucose. At the end of five minutes the patient became nauseated and the inhalation was stopped. Hourly urine specimens for three hours contained only 0.1 per cent glucose. The following day the same experiment was repeated. At the end of five minutes the patient again became nauseated; the inhalation was again stopped. After three minutes' rest the inhalation was again started and continued for five more minutes. The urine one hour later was absolutely free from sugar. Even the 0.1 per cent of glucose present in the urine before the experiment was begun had disappeared. Two hours later, however, the fasting trace of glucose reappeared.

CASE 2.—Mrs. H., 24 years old, gravida iii. A routine examination during the third month of pregnancy revealed 0.3 per cent glucose. She had one miscarriage; one child is living and well; her past history was negative; her physical examination was entirely negative.

The urine following 100 gm. of glucose revealed 0.9 per cent glucose. The next day twenty minutes after the ingestion of 100 gm. of glucose this patient received 1/100 gr. of atropine sulphate. The three hour urine following the glucose contained 0.8 per cent glucose. The following day 1/100 gr. of atropine sulphate was given 15 minutes before the glucose. Hourly urine specimens for three hours revealed less than 0.1 per cent glucose.

CASE 3.—Mrs. F. P., 28 years old, gravida ii, was first seen during second month of pregnancy; urine at this time was negative. Urine examinations every three weeks were always negative until the sixth month, when her urine for the first time revealed a trace of glucose, proved by the usual tests for glucose. Her past history except for a number of attacks of tonsillitis was negative. Her first pregnancy a

year ago was characterized by marked toxemia. She had general anasarca, high blood pressure, albumin and casts in the urine. As she was bordering on convulsions, Dr. Buford Hamilton delivered her during the eighth month of twin girls. She made an uneventful recovery. Her physical examination during her second pregnancy except for the above trace of glucose in the urine revealed nothing abnormal.

Following the ingestion of 100 gm. of glucose this patient's urine revealed from 0.8 to 0.9 per cent glucose. The same amount of glucose given twenty minutes after the administration of 1/100 gr. of atropine sulphate hypodermically revealed the slightest possible trace of glucose, not enough to run a quantitative test. Atropine sulphate 1/100 gr. given twenty minutes after the glucose failed to have any effect on the glycosuria.

COMMENT

It is rather unfortunate that the last two patients refused to go through the oxygen inhalation experiment. The fact, however, that oxygen behaved so much like atropine sulphate in Case 1, in my case of renal glycosuria previously reported, as well as in several cases of alimentary glycosuria to be reported later, makes it quite likely that oxygen would have the same effect on the other two pregnancy glycosurias. It is interesting to note, however, that whereas $\frac{1}{100}$ gr. atropine sulphate inhibited glycosuria following the intake of glucose, it did not cause the disappearance of the fasting trace of glucose. The oxygen, on the other hand, not only inhibited glycosuria but also caused the fasting trace of glucose to disappear for two hours. I believe, however, that had I used larger doses of atropine sulphate I might have caused even the trace of fasting glucose to disappear. This belief is based on the fact that in none of these patients did atropine sulphate produce a marked physiologic effect, except an increase in heart rate from twenty to thirty beats. The above results with atropine and oxygen, as demonstrated in the so far reported cases of renal glycosuria, make me believe that there is something in common to all of these glycosurias, and that atropine and oxygen have a common mode of action. Until a better explanation can be offered for this peculiar inhibitory effect of oxygen and atropine on renal glycosuria, I wish to suggest that renal glycosuria is due to a suppression of glycogenesis caused by excessive stimulation of the vagi nerve endings in the liver cells. Just as the heart is controlled by inhibitory as well as accelerator nerves, so it is possible that glycogenesis is under double nerve control. Since stimulation of the sympathetics to the liver is well known to cause a conversion of glycogen into glucose and a discharge of the latter into the blood, it is quite likely that stimulation of the vagi nerve endings inhibits glycogenesis. The idea of a disturbance in liver function during pregnancy is well recognized and was first pointed out by Franz Yäger in 1914.⁴ Attempting to test the liver function dur-

ing pregnancy, Yäger gave 100 gm. of levulose to pregnant women, and recovered the levulose in the urine of 65 per cent of his cases.

The fact that atropine sulphate having a specific depressing effect on the vagi nerve endings inhibits these glycosurias would suggest that the functional disturbance is in the vagi nerve endings rather than in the liver cells. The general increase in reflex excitability during pregnancy is too well known. The frequent occurrence of vomiting during pregnancy would certainly suggest an increased excitability of the vagus. Admitting the possibility of a state of vagotonia during pregnancy, it is also possible that the vagi endings in the liver cells, being overstimulated, inhibit glycogenesis. The fact that the inhalation of oxygen inhibited the renal glycosurias would also suggest the possibility of the vagus interfering with oxidations necessary for the conversion of the glucose into glycogen.

The well known greater strain thrown upon the kidneys plus the frequency with which the kidneys participate in pregnancy toxemias would suggest a greater stimulation and consequent increase in the excretory function of the kidneys during this period. This increased excretory function is perhaps responsible for the appearance of glucose in the urine when the sugar is at a normal level in the blood.

REFERENCES

- ¹München. Med. Wehnschr., Dec. 10, 1920.
- ²Deutsch. Med. Wehnschr., Sept. 22, 1921.
- ³Jour. Am. Med. Assn., March 24, 1923.
- ⁴Ztschr. f. Geburtsh. u. Gynäk., 1914, lxxiv.

205-207 ARGYLE BLDG.

RATIONAL OBSTETRICS FROM THE TEACHING VIEWPOINT*

BY J. C. APPLGATE, M.D., F.A.C.S., PHILADELPHIA, PA.

Professor of Obstetrics, Temple University, Department of Medicine; Obstetrician, Samaritan and Garretson Hospitals.

WIDELY different views with regard to the wisdom of teaching by precept and example, some of the present-day methods in obstetrics prompted the selection of this title.

While the term rational rather implies that some methods are irrational, let it be understood that this is not a criticism of any method or methods that have proved to be for the best interests of the mother and child in decreasing mortality and morbidity, or in the alleviation of suffering during childbirth.

The methods selected for discussion regarding which opinions differ greatly are: First, "the injudicious use of pituitrin"; second, "an inconsistent idea with regard to diaphoresis in eclampsia"; third, "the abbreviation of the second stage of labor by forceps, with or without perineotomy," and fourth, by "podalic version." It is also an appeal, from the teaching viewpoint, for safeguards around women during pregnancy and with some of the unusual and newer methods during labor. Not new, they are old methods with new applications.

We stand for everything that is new, modern and progressive just so long as *bona fide* statistics, reasonably large in number, prove the efficacy of said methods.

Remarkable progress and improvement have resulted from prenatal study and treatment, also from postnatal observation and care; likewise from the recognition of the necessity for cleanliness (asepsis and antisepsis), but in the conduct of delivery, in the opinion of the writer, the pendulum is inclined to swing too far from conservatism or ultraconservatism, in the direction of radicalism, and in some instances, irrationalism. Not at the hands of the promulgator of a new or special method. All new things must have a beginning and the originator of a new method is usually a specialist, with experience, and competent to do the thing successfully, that he or she has started to do.

The danger lies not with the originator, but with the fearless imitator, the less competent, or the enthusiastic beginner.

For example, after reading his paper on podalic version before this Society by perhaps the greatest present-day exponent of that method of delivery, a hospital interne was present and insisted that he be given the privilege of delivering all women in the wards by version

while he was on the service, apparently blind, or at least near-sighted, to the dangers attending the operation.

I. INJUDICIOUS USE OF PITUITRIN

Not less dangerous is the injudicious use of pituitrin. A most valuable remedy when cautiously administered and yet a dangerous drug before or during delivery unless the patient's susceptibility to it is first ascertained by its administration in small doses. The fact that five or six minims will create more vigorous contractions in labor in some women than a whole ampule will in others, while in still others it is absolutely inert, are facts too well known to need further comment.

Following the advent of this extract, when its value as an adjunct in labor was first heralded, it was not unusual to hear physicians state that "they had put aside their forceps and no longer waited around for a long labor, that they simply gave an ampule of pituitrin and promptly terminated it."

This attitude still prevails with some of the profession. The temptation to hasten labor in this manner is often great, but the danger cannot be overestimated unless the physiologic effect is first determined by the administration in minute doses and then only after all contraindications, both fetal and maternal, have been eliminated.

Not long ago I saw a woman in consultation who died from rupture of the uterus, before she could be gotten to the hospital for operation, following the administration of an ampule of pituitrin, near the end of the first stage of labor; a para vii, with a broad flat pelvis and the child in the transverse position. According to the history this woman had violent pains and contractions soon after the administration of the drug, then suddenly collapsed, so that there could be no question as to the cause of the rupture.

Not only is the mother in danger but likewise the unborn child, from compression as a result of the more or less continuous contractions, one of the characteristic features, should the patient respond to the action of the drug. Again the danger lies not so much with the obstetrician who is familiar with these facts, as with the practitioner doing obstetrical work who is busy along general lines and probably neglects to keep well informed as to the dangers in connection with this practice.

II. DIAPHORESIS IN ECLAMPSIA

"Exhaustion of a patient and concentration of the toxins from sweating in eclampsia," has always seemed to me to be an erroneous or at least inconsistent idea in view of the fact that nearly all educators agree and teach that elimination through the skin as well as

through other channels is most essential, regardless of other plans of treatment.

Under normal conditions it is estimated that the excrement through the skin of an adult averages about one pound in twenty-four hours.

In eclampsia the pores are inactive or blocked, which means retention and greater toxicity, besides concentration of the toxins by skin elimination is an utter impossibility as long as water is administered. By mouth, if the patient can swallow, if not the continuous alkaline solution (Fischer's) by proctoclysis dilutes the toxins, prevents concentration and guards against exhaustion.

Better still, especially if the patient is retching or vomiting, is the administration of the alkaline solution through the stomach tube directly into the stomach after it has been washed out. In this manner it has been shown that the water is readily absorbed and promptly reaches the blood stream.

Furthermore, sweating to the point of exhaustion is not necessary as moderate diaphoresis serves the purpose. Mrs. C., a primipara, had three eclamptic convulsions at the beginning of her seventh month, but responded to treatment, and every third or fourth day for two weeks requested the pack on the strength of her improved subjective symptoms, together with the desire to reach the age of viability of the child and in each instance experienced a sense of great relief, and this is only one of many similar instances. She was delivered of a healthy child two weeks before term.

III. ABBREVIATIONS OF THE SECOND STAGE OF LABOR

The thought uppermost in my mind is to elicit discussion on a subject, practiced and preached, to some extent; viz., the so-called "elimination of the second stage of labor," a thing that cannot be done.

Labor by the natural route consists of three distinct stages: First, the stage of dilation or dilatability; second, the stage of expulsion or extraction, either with forceps or by version; third, expulsion of the placenta and membranes with retraction and contraction of the uterine muscles and the control of hemorrhage, so that the only way in which the second stage can be eliminated is by cesarean section.

Abbreviation of the second stage and modification or elimination of the pains of the same, is quite a different matter. This can be done and in my opinion should be done with a general anesthetic within the limits of safety, together with forcep extraction when there is delay, but it is not the pains of the second stage that give us the greatest concern. It is the sharp cutting pains of the first stage, when the patient can scarcely be made to realize that she is progressing, then it is that she endures both physical and mental

agony, when little more can be done than to modify the pains with mild narcotization, while in the second stage the pains may be greater, they are not so sharp, nor cutting and are better borne because she realizes that she is progressing.

Here obstetric anesthesia is a decided advantage, not only to modify the pains, but to aid in the relaxation of the outlet and in the exercise of the voluntary forces, going a step further, to full anesthesia during the completion of this stage; also when forceps are to be applied. Some women of course do not want an anesthetic and do not require it.

Obstetrics is a surgical subject, normal as well as operative obstetrics, in the sense that asepsis and antisepsis should be as rigidly enforced in the one as in the other. Microorganisms will quite as readily invade the maternal organism through the normally bruised vaginal mucous membrane as they will through a laparotomy incision. On the other hand labor, in the absence of pathologic conditions, is a physiologic process and it is for the best interests of the mother and her offspring to maintain the physiologic as nearly as possible, modifying or eliminating pain, the terror of childbirth, whenever it is possible to safely do so.

IV. PODALIC VERSION

Podalic version has its definite indications, i.e., the malpositions, prolapsed cord, some cases of eclampsia, some placenta previas, etc., as taught in all medical colleges, with manikin and on the living subject, with emphasis on the contraindications and the dangers attending the operation. I question the wisdom, however, of deliberately converting the normal into the abnormal or the physiologic into the pathologic simply for the purpose of shortening the second stage when it can be done in a safer way and without pain.

The women of Buffalo and vicinity are safe in the hands of Dr. Potter. We admire him for his skill. He is an expert at the business. The same is true with a few others, imbued with the same idea, who have succeeded well and have made good reports, but what of the countless numbers subjected to this plan of treatment by the enthusiastic beginner or the less skillful following this example, who may not always recognize a weakened area in the uterine wall, which predisposes to rupture, a high sacral promontory, a slightly contracted pelvis, retention of the fetal head from extension, the result of faulty manipulation, a head that is larger than it appeared to be with no opportunity to mold as with the forecoming head? Nor is it always the beginners or the unskillful that make these errors of judgment.

The fetal mortality in podalic version is of necessity high. Dr. Potter's series is perhaps the largest of any one operator, with a fetal mortality of 7 per cent plus, including those that die during the

first two weeks, with the exclusion of his border-line cases, from 8 to 10 per cent, who are subjected to cesarean section. Dr. Robert L. Dickinson, an expert in hospital reviews and surgical accounting, who obtains his averages from the statistics of many hospital records, found that the fetal mortality in hospitals that excluded abortions and ectopics from the obstetric service, and this includes stillbirths and those that die within ten days after birth, was about 3 per cent. He further states that while cesarean section varies from 0.3 to 18 per cent, the average percentage based on legitimate indications for section, is from 1 to 2 per cent, and that hospital records that show 2 per cent or over of cesareans, should call for investigation.

So that if the 8 or 10 per cent of cesarean sections in the podalic version clinics were limited to the legitimate indications for section, their fetal mortality would be much higher than 7 per cent.

The subsequent morbidity following the ironing out process and dilation of the vaginal outlet sufficient to give birth to an un moulded after-coming head with so small a percentage of lacerations, should also be taken into account. There must of necessity be marked relaxation following this process.

Why teach by precept or example the conversion of the perfectly normal, into the abnormal, or the physiologic into the pathologic when it is absolutely contrary to the laws of nature?

V. FORCEPS

The wisdom of shortening the second stage of labor with forceps under anesthesia when there is delay, is not questioned but strongly advocated, thereby eliminating pain and oftentimes preventing pathologic conditions to the newborn. My belief and teaching has been and still is, that more cranial and intracranial injuries to the newborn occur from delay during the second stage than from forcep delivery when the forceps are correctly applied and carefully manipulated.

Exceptions to this rule, of course, are when there has been a mistake in judgment as to the degree of disproportion, when section should have been performed instead of forceps delivery.

Very rarely do birth injuries immediate or remote, result from the applications of the forceps, when the application is correctly made, with the application in relation to the occipitomenal plane of the head and not one blade partly over the occiput and the other partly over the cheek and forehead, as often occurs unless cautious, when the application is made before rotation is complete. Then too, I have frequently observed that the beginner is inclined to depend largely upon traction and very little upon correlation of the long axis of the head with the axis of the pelvis, especially of the outlet,

thereby maintaining the curve of Carus. This is an art in which medical students cannot be drilled too thoroughly, first with the manikin and then on the living subject under supervision during their internship.

VI. EPISIOTOMY

Episiotomy is an old operation, more or less radical, quite easy of accomplishment, so far as making the incision is concerned, though more difficult to complete and obtain satisfactory results.

This is an ideal operation, as an adjunct to forcep delivery when the indications are definite, i.e., when immediate delivery is demanded without time for proper moulding and dilation or when it is clearly apparent that the laceration is going to be extensive and ragged, or any condition in which forceps delivery is indicated, *except* for the one purpose, viz., that of shortening the second stage of labor.

So that I question the wisdom of teaching in any sense routinely this rather new application of perineotomy originated by Dr. De Lee.

With the gynecologist or obstetric surgeon and their perfected technique, under proper environments, in the hospital, the results are usually most satisfactory but all women are not going to be confined in the hospital and many of them will continue to be confined by their trusted friend, the family doctor.

Furthermore many primiparae with whom lacerations are apparently inevitable can be delivered under full anesthesia with forceps, after dilation of the outlet, without episiotomy and without laceration.

I recall that of the last ten primiparae delivered with forceps, seven had no laceration, two had first degree only, and one with an enlarged vaginal gland had a lateral laceration without involvement of the skin. All united promptly after the minor repair and no scar exists to remind them of an episiotomy.

Spontaneous lacerations occur at the weakest point of the perineum and when properly coaptated, whether at the immediate or intermediate period and are well repaired, that weak point is strengthened.

The writer is not prejudiced against episiotomy. As stated, it is ideal with definite indications, but subject to complications, as are other surgical procedures, and why subject a patient to this surgical procedure that might otherwise be a physiologic labor, when for no other purpose than to shorten the second stage? Why cut through the barrier, the rim of the vulval orifice, so constituted by Nature as to protect the weaker tissues beneath, when without the operation there would probably be no laceration or only one of minor importance? One has no assurance that the laceration will not extend beyond the depth of the incision.

In this connection a well-known, successful gynecologist informs

me that in a certain percentage of his cases with whom he felt that episiotomy was indicated, lacerations extended from the depth of his incision to the pelvic bone, and one recently in three directions, also that in 75 per cent of those operated there had been no primary union or only partial union. He further states that by reason of the usual location of a perineotomy incision, the tissues involved and the disturbance of the circulation, make the secondary repair much more difficult than the secondary repair following a spontaneous laceration, which has occurred at the weakest point in the perineum.

Two other facts have been noted, a sensitive scar in some instances and in others, loss of contractility on the one side. If primary union occurs the perineum is unique and the support is good, but relaxation above the perineum is dependent upon the degree of involution, as it is in all other deliveries.

Mrs. F., a primipara, was delivered two years ago, in the State of New York. Episiotomy was performed, although the labor, according to the history was perfectly normal. Primary union followed, and she still enjoyed health barring sensitiveness of the scar.

She is now pregnant again and at three and a half months' gestation had a second degree procidentia and was obliged to lie in bed for ten days. The episiotomy was not a factor in the production of the prolapse, but it did not do what is ordinarily expected, prevent it.

Of course the serious complications are rare, but they do exist and like the complications and dangers in connection with podalic version, should be emphasized, and from the teaching standpoint, in the writer's opinion the operation limited to those with definite indications.

The question naturally arises why not make experts out of medical students by drilling them in these special methods. That is done during the curriculum course with manikin and on the living subject, again during their internship, in the hospital, on the living subject under supervision, but an expert cannot be made any more than a specialist can be made.

I recall an instance where a class had been drilled pretty thoroughly in the methods of doing version and in the management of delivery with the breech presenting. One member of the class graduated, attained quite a practice and became quite enthusiastic with his work in obstetrics. On this occasion extension with retention of the after-coming head following version occurred and not knowing or forgetting what next to do, amputated at the base of the brain. It is needless to say that it was with some difficulty that the head, rolling around in the uterus was extracted. He simply lost his head, as others will do if they attempt something beyond their skill, and the patients are the victims.

Efficiency can only be attained in the school of practice, by devotion to work along special lines of his choosing, or to postgraduate work. The medical curriculum is too crowded for specialization.

In my clinics and teaching at the University our attitude with regard to the special methods and in fact all methods may be summarized as follows: No routine is permissible except with minor affairs, such as diet, with normal cases, etc.

Every case is a subject for individual study and management.

The physical examination includes the determination of her tentative manner of delivery, whether normal, based on her pelvic dimensions, also the size, presentation and position of the fetus.

As with elective cesarean section, those cases with definite indications for version are determined in advance of labor, while emergency section, forceps delivery, developing indications for version and episiotomy are decided upon during labor.

We endeavor to teach in that broader sense whereby our students are given the benefit of the teachings of other clinicians—whose ideas may or may not differ from our own, with their reasons for so doing, and finally, disregarding wholly that sentimental idea that “the greater the pains in childbirth the greater the love and affection for her offspring,” the labor is made as short as it can consistently be made within the limits of safety and as nearly painless as it is possible to make it, with mild narcotization, preferably minute doses of morphine (gr. $\frac{1}{4}$) and scopolamine (gr. $\frac{1}{100}$) during the first stage and chloroform or ether during the second stage. Chloroform is the choice with the normal cases and those who are toxic with kidney insufficiency, and ether with operative cases, also those who are toxic with pronounced liver pathology, with spinal anesthesia in reserve when ether and chloroform are contraindicated.

A NEW METHOD OF TEACHING PELVIC DIAGNOSIS BY MEANS OF MANIKINS*

BY J. K. JAFFE, M.D., PHILADELPHIA

(*Department of Obstetrics, University Medical School, also Department of Gynecology-Obstetrics, Graduate School of Medicine, University of Pennsylvania.*)

BECAUSE the method of teaching pelvic diagnosis by means of manikins has met with universal favor on the part of all those who have seen them, and because, unfortunately, so few have had the opportunity of seeing them, I am prompted to bring this subject before you.

The opportunity offered to the medical student for examining a normal pelvis is entirely inadequate, and I am convinced that a great number of women with some pathologic condition prefer to remain away from dispensaries connected with medical schools, in order to avoid being exposed to the embarrassing gaze and the painful ordeal of repeated internal examinations. Even in Europe, the patients in the clinics for diseases of women, are beginning to resent being used as models for study.

No physician deliberately wants to give pain to his patient, cause her embarrassment or in any way go against her wishes; yet, this has been exactly the unfortunate position of the teacher in gynecology. Anything devised to improve the method of teaching this important branch of medical science, any apparatus brought forward with the idea of supplanting the human being as a model for teaching gynecology, should deserve friendly interest and indulgence. It is with this idea, and this attitude, that I approach what is known in Europe as the Blumreich Phantom.

The Blumreich Phantom is an anatomic model, consisting of an actual human pelvis, devised for the purpose of studying the normal and pathologic contents of the female pelvis by means of palpation and vaginal touch.

Historically, it may be of interest to know that the apparatus, devised by Prof. Blumreich, of Berlin, was first described by him at the Gynecologic Congress at Freiburg in 1913, and despite the medical disorganization of Europe, on account of the war, we find these phantoms in use in the Universities at Halle, Kiel, Koenigsberg, Freiburg, Berlin, Vienna, Zurich, and Milan. As far as I know, nowhere in America is this course being given, with the exception of the Graduate School of Medicine, University of Pennsylvania, and the Undergraduate Medical School of the same institution. Kroenig, Freund, Wertheim,

*Read before the Philadelphia Obstetrical Society, May 3, 1923.

and others, who had seen the Freiburg demonstration, and who had later seen students actually at study, have been most enthusiastic and generous in their praise of the course as given by means of these models.

In Europe this phantom is truly revolutionizing the study of gynecology. It does away, to a great extent, with the unwilling human model. It gives every opportunity for the teacher to freely offer helpful suggestions without being overheard by the patient. The student does not have to wait for the operating table or the postmortem room to ascertain how far he was correct in his diagnosis; and most important of all, within the course of thirty or forty demonstrations he is enabled to study the widest range of pathologic conditions. The specimens shown during a single season may truly represent the collection of a lifetime of a group of busy surgeons. This new teaching device creates in the student a highly developed sense of touch; he can immediately verify his palpation. By merely throwing back the abdominal covering, the eye sees what the hand has felt.

I shall devote the space permitted for the presentation of this subject to describing the method of study, of preparing and assembling the various specimens, and shall deal solely with the technical details employed in preparing the models.

My association with Prof. Ludwig Blumreich at the Franziskus Hospital, Berlin, has enabled me to make a close study of the apparatus which bears his name. His permission to use his formulas, diagrams, plates and drawings is hereby gratefully acknowledged. All the pelvic organs used for study purposes in our work here, excepting the normal and pregnant uteri, have been obtained from the clinics of Prof. B. C. Hirst and Prof. W. R. Nicholson, through their courtesy and kindness. The operative output of the Lankenau Hospital has also been made available for our use, through the generosity of the pathologic laboratory of that institution. I am also grateful to Prof. Hewson for his whole-hearted assistance and cooperation.

The class room contains several ordinary wooden tables, not unlike the familiar kitchen table, upon which are mounted a half-dozen or more of these models (Fig. 1). The student examines each one of these manikins bimanually, notes his findings on a slip of paper, and makes drawings of what he feels. These papers are later marked by the teacher to give to the student his proper grading. The pelvic cover, which corresponds to the abdominal wall of the living patient is then withdrawn, thus giving a chance for the student to compare his provisional diagnosis with the actual pelvic findings. At the same time it affords an opportunity for the teacher to emphasize salient points in regard to the special subject under discussion.

The abdominal covering is fastened anteriorly to a metal plate by means of metal clasps, and posteriorly it is merely suspended by weights; thus the abdominal covering "gives" with a certain amount of resistance to the palpating hand. This simulates the resistance of the abdominal muscles met with in examining the living subject. The aim of this entire manikin course is to imitate, as far as possible, actual conditions found in the living subject, and by closely following anatomic

relations, by having the pelvic organs properly placed and correctly suspended, that aim has been practically attained.

The metal frame work, or stand (Fig. 2.) upon which the pelvis is mounted, consists of adjustable steel bars, an adjustable ring, about the size of the rim of a small wheel, and corresponds to the human waist line. An arm extends from the upright bar on each side of the frame work, and these arms are surmounted by pulleys, which, together with the three pulleys on the metal ring afford a means for holding the abdominal covering correctly in place. The two long thumb screws have ball-shaped heads which fit into the acetabulum, and tend to hold the model in place. The small base supports the pelvis from below.

To imitate, as nearly as possible, the human abdominal wall, the covering is taken from the belly wall of a hog, and is made of various thicknesses, from 0.5 to 5.5 cm. Seven grades of these coverings are usually maintained in the laboratory to

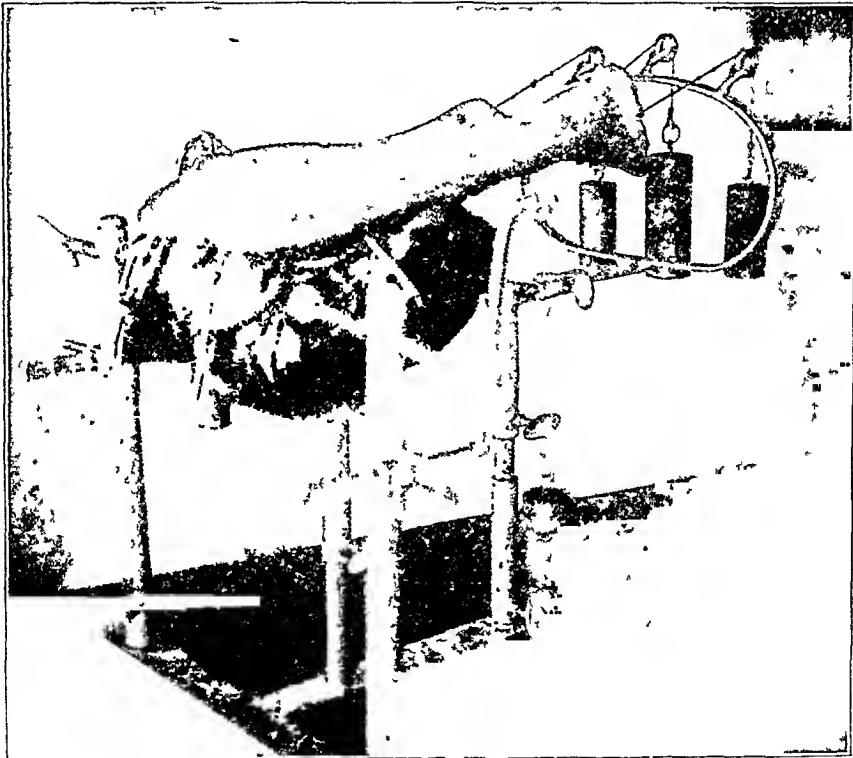


Fig. 1.

demonstrate the ease of examining patients with thin abdominal walls, and the corresponding difficulty of palpating an abdomen of a stout patient. The covering is 33 cm. wide and 35 cm. long, semi-circular in front to fit the anterior and upper surface of the pelvis to which it is attached by the clasps.

The frontal plate is of metal, fitting over the pubic bones of the pelvis. It has grooves corresponding to the exit of the round ligaments from the abdominal cavity, and also spaces for attachment of the abdominal covering.

Without considering the accessories just mentioned, the description of our model conveniently falls under two headings.—

- 1.—The Pelvis, or Receptacle.
- 2.—The Pelvic Contents, Normal and Pathologic.

1. *The Pelvis*.—The pelvis is used as a frame work or receptacle for such conditions as it is desired to study, be it a normal pregnancy, fibroid uterus, an ovarian cyst, displaced uterus, or any other condition. It is obtained from the cadaver by

subcutaneous resection to permit better penetration of the preservative fluid. After a preliminary and thorough washing, it is immersed in a special fluid for three weeks.

The usual mixture of alcohol-glycerin, or sublimate-glycerin is not used here, because these solutions, while being excellent preservatives, cause a certain amount of change in the consistency of the soft parts. The vagina no longer maintains its natural elasticity, the peritoneum tears easily, and the bladder becomes brittle. The solution used here, on the other hand, preserves the natural state of the tissues. Vagina, rectum, bladder, and connective tissues maintain their natural properties very closely and remain soft and pliable indefinitely.

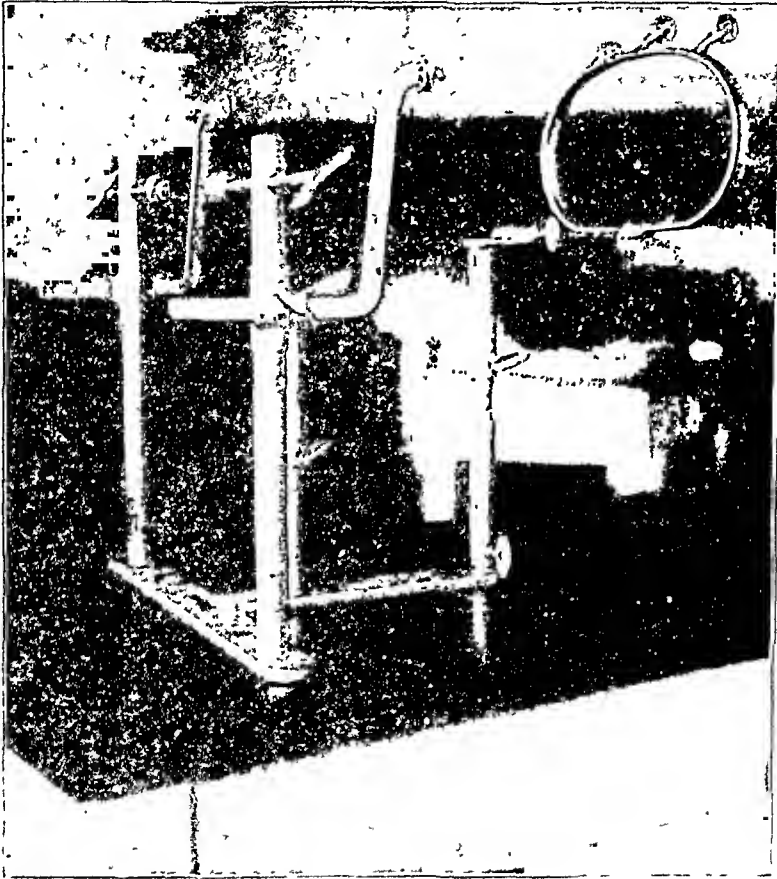


FIG. 2.

Repeated bacteriologic tests conducted for three years on these models so treated, proved them to be free from pathogenic bacteria, so that a gynecologic examination of these models is less dangerous to the examiner than that conducted on the living subject. From the bacteriologic point of view the wearing of rubber gloves is unnecessary.

When the pelvis is removed from the "pickling solution" work is resumed. The peritoneum is fastened to the upper edge of the pelvis, the lower gut is fastened to its normal position, and a high supravaginal hysterectomy is performed. To hide from view the rough ends of muscles and blood vessels, the entire outer surface of the pelvis is covered with a fine batiste cambric. The cervix stump is made even and smooth, and all raw edges are covered by peritoneum. To this cervix stump are attached four silk threads about 20 cm. in length, to receive similar strings from the uterus. In addition to the four silk threads attached to the cervix stump, heavier

threads are fastened in the pelvis for arranging various displacements, fixations and adhesions.

In all cases the uterus is amputated at the internal os, the surface is made even and smooth, and four silk threads are attached to this surface to correspond to the four threads of the cervix stump. Other strings are fastened to the uterus to replace removed ligaments. The uterus, loaded down with pathologic appendages or abnormal growths is then fastened to the cervix stump, the round ligament strings are placed in the grooves on the metal plate provided for that purpose, weights of a definite size are hung on the ends of these round ligament strings to keep the position of the fundus constant, the abdominal cover is adjusted and the model is ready for study. The knots are not felt on examination.

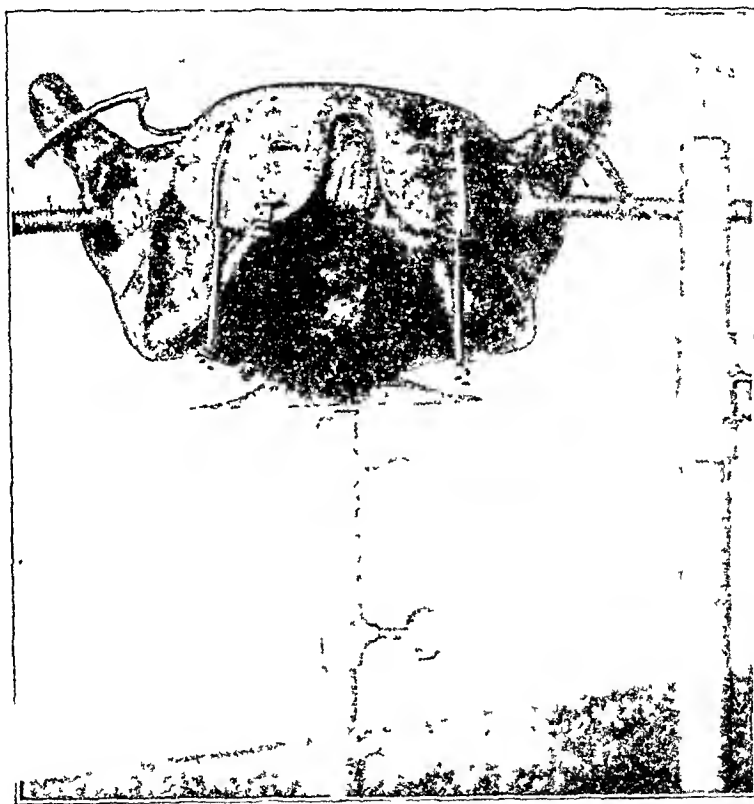


FIG. 3.

The pelvis with the vaginal portion of the genital tract remains the same at each demonstration. We place different pelvic organs to study various pelvic conditions in the same pelvis.

A completed pelvis with frontal plate in place ready to receive the intrapelvic structures and the abdominal covering is shown in Fig. 3. These models are best preserved dry, merely exposed to the fumes of the preservative solution. They can keep indefinitely.

2. *The Pelvic Contents.*—To obtain pelvic specimens for our collection, we must depend entirely on the generosity of the operating room; and no part of pelvic viscera thus obtained is discarded. It is surprising how often laboratory technic reconstructs conditions suitable for study. Ovarian cysts removed separately, are connected with normal uteri, and made to appear as though the cyst was at all times part of the removed uterus. Enucleated myomas are sewed to the fundus to form the subserous fibroid, and normal appendages are often connected to a pathologic

uterus, when the appendages are not removed along with the uterus by the surgeon. Cuts and tears are easily repaired and these repairs are not felt on vaginal touch. A tube with an unruptured gestation obtained from the operating room is attached to a normal uterus for the purpose of studying an ectopic pregnancy. The normal uterus, and the uterus with an early pregnancy are obtained from the mortuary or the dissecting room.

To study uterine displacements, we make use of the various ligament strings together with the pelvic strings, making some longer, and shortening others, at all times closely following the pathologic anatomy of the condition to be studied.

No matter what pathologic specimen one may wish to prepare for study, the principle involved in the actual technique of preparing them is the same. The effort is at all times to reconstruct, in all its details, the pathology as it existed in the pelvis of the patient operated upon.

The question that naturally presents itself at this time, is, how do all soft tumors, hydro- and pyosalpinxes, ovarian cysts, dermoids, and pregnancies, maintain their natural shape and soft consistency? When a cyst or other tumor containing fluid is placed in a preservative jar, it will be noticed that in the course of a few weeks the fluid filters through the walls and the tumor becomes a shapeless bag. To maintain the natural shape and softness of the tumor proved to be an extremely perplexing problem. This was finally solved by making up a preservative solution with Riedel's gelatin as its chief constituent, the amount of gelatin depending on the degree of hardness desired. The natural contents of the tumor are first withdrawn, and the gelatin solution injected while hot.

By means of these manikins we are able to demonstrate hematoceles, exudates, intestinal adhesions and pelvic infiltrations. It is even possible to construct a manikin for studying pregnancy at term, with a real uterus, and a real fetus, where the student can hear sounds simulating heart beats.

RESULTS OF INTERMITTENT ASPIRATORY HYPEREMIA IN GYNECOLOGY, WITH A REPORT OF ONE HUNDRED AND TWENTY-THREE CASES*

BY RAYMOND L. BRADLEY, M.D., HOUSTON, TEXAS

IT is my purpose, in this brief discussion, to summarize observations made in a series of one hundred and twenty-three cases of various diseases of the pelvic viscera treated with aspiratory hyperemia in accordance with the suggestions of Dr. J. Van Doren Young. While many cases of obstinate nature beyond doubt require operative treatment, I am convinced that in many of the less advanced cases much relief from annoying symptoms, as well as total disappearance of macroscopic lesions, may often be obtained by this method.

Young's theory is based upon the principle that Nature combats infective processes chiefly through the medium of the circulation of the blood and lymph. The induction of intermittent hyperemia by means of aspiration and stimulation through a vacuum blow applied to the cervix is more effective than that accomplished by Bier's cups. In addition to the transitory hyperemia there is produced a pronounced contraction of the uterine musculature, which, in my opinion, is the important factor leading to improvement in most of the pelvic conditions commonly observed. A complete description of Young's apparatus may be found on page 282 in the September, 1922, number of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY. The vacuum is produced in a long glass tube, one end of which covers the cervix while the other is connected to the suction pump by means of rubber tubing of suitable length. Between the pump and the vacuum tube is a cut-off valve, by means of which air may be admitted, thus readily decreasing or eliminating the vacuum as desired. There are a variety of tubes suitable for variations in the services to be treated.

An important point to be remembered in the application of this method, is to carefully note the degree of response on the part of the patient to these stimulations. I have followed Dr. Young's classification, according to the degree of response, as it divides the cases very satisfactorily and enables one to keep accurate notes on the progress in a given case. The terms -1, 1+, 2+, 3+ and 4+ are used as shown in the following table:

-1 No uterine contraction obtained.

*Read before the South Texas District Medical Association, Houston, October 12, 1923.

- 1+ Slight pain, but no palpable uterine contraction.
- 2+ Normal uterine contraction. Ordinary menstrual pain.
- 3+ Over-irritable condition of uterine muscle. Severe menstrual pain.

4+ Labor-like uterine contraction with very severe stabbing pain. In two of my patients having this reaction nausea was present for a few moments. This degree of response is rarely seen, except in post-partum, postabortive and acute inflammatory conditions.

The degree of stimulation to be applied in each individual case is the keynote to successful treatment. This was determined by Young after a long series of observations. After classifying a given case according to the above table, the following general rules may be applied with variations as may be found suitable in specific instances. One stroke of the piston is considered a stimulation.

In 2+, or normal reaction cases, twenty-five stimulations should be used, covering a period of about five minutes, five being given each minute. The vacuum is released, of course, between each stimulation.

In 4+ cases, I have used from two to four stimulations within ten minutes. When this extreme reaction is due to acute infection it has been my experience that this method is unsuitable and had best be discontinued.

In 3+ cases, four to ten stimulations may be used within six minutes. In intermediate and minus cases, two strokes of the piston should be used without releasing the vacuum for a single stimulation, and the number of stimulations and period of time increased at discretion.

A very interesting point, and one also observed by Young, is that both minus and plus cases, as the treatment progresses, will approach and finally reach the 2+ reaction. This occurred in all but four of my cases, all of which gave minus reactions at the beginning, and two of which are still under my care.

The question naturally arises in one's mind: "What is accomplished by this drawn out procedure?" When the tube is applied to the cervix, and a partial vacuum created, the first thing that occurs is forcible drainage of all patent cervical glands, thus emptying them of what infection they may contain. Continuation of the suction induces an active hyperemia of the cervical tissue *en masse*, filling the glandular and intracellular spaces in muscle bundles with blood fresh from the cervical arteries. The lymphatic flow is equally affected. It is, probably, this active hyperemia which causes stimulation and contraction of the uterine musculature. This contraction can actually be demonstrated by palpation, especially in cases with retroversion. The effect of active muscular contraction upon a diseased uterus, especially if of a congestive type, is obvious and requires no comment. Every physician is familiar with the relief obtained from ventral sus-

pension in a retroverted, congested uterus. Circulatory stasis is relieved when rhythmical contraction of the uterus is induced, and inflammatory conditions are thus combated in a natural manner.

The conditions for which I have applied active hyperemia are summarized as follows:

CLASSIFICATION	No. OF CASES
Infected cervix with more or less lymphangitis	59
Dysmenorrhea	10
Chronic general pelvic inflammatory disease	29
Subinvolution of the uterus	4
Ectropion	3
Subacute gonorrhea of the cervix	2
Retroversion, cystic cervix, leucorrhea, tubes normal	6
Infected cervix (posthysterectomy)	10
Total	123

The results are as follows:

CONDITION	AV. NO. TREATMENTS	RECOVERY	IMPROVED	NOT IMPROVED
Infected cervix, lymphangitis	30	38	17	4
Dysmenorrhea	22	3	4	3
Chronic general pelvic inflammation	35	0	24	5
Subinvolution of uterus	24	3	1	0
Ectropion	30	0	0	3

CONDITION	AV. NO. TREATMENTS	RECOVERY	IMPROVED	NOT IMPROVED
Subacute gonorrhea of the cervix	4	0	0	2
Retroversion, cervix, leucorrhea	40	5	1	0
Infected cervix posthysterectomy	25	8	2	0

These patients came for relief of the usual symptoms corresponding to the pathology present, and where I have used the word "Recovery," no evidence of the condition has remained and all symptoms have disappeared. The usual topical applications, such as mercurochrome, silvol, silver nitrate and others, have been used in all cases in conjunction with the aspiratory treatment. Also, due consideration has been given the general systemic and hygienic condition of each patient. In cases of enlarged cystic cervix, incision of all cystic areas preceded the application of the tube. The results in this series of cases are better than in cases where Young's treatment was not used, regarding both the final result, and the length of time the patient was under my care.

Concerning the value of this method as compared with other methods, I believe that a conservative estimate may be stated as follows:

Where forcible drainage and uterine tone is desirable, intermittent aspiratory hyperemia has its place in treatment.

In cases of infected cervix with lymphangitis, while complete recovery occurred, seemingly in 38 cases, lasting recovery could hardly

be expected, since complete eradication of the infection of the deep cervical glands would be unlikely. Certainly it would not occur in many cases. As a palliative measure in young women, where preservation of a completely intact cervix is desirable, it may be used.

Dysmenorrhea is probably a symptom rather than a disease entity. Where circulatory conditions are responsible, this method may give temporary relief. Since compiling these cases, two of the three cases listed as recovered have returned with a recurrence of symptoms.

While it might seem that the application of this method to cases of chronic pelvic inflammatory disease might do harm rather than good, such is not the case. The benefit derived has been relief from backache and decrease of cervical discharge. These cases should all be operated upon, generally speaking, but where this is refused, more or less relief from the most distressing symptoms may be obtained from time to time.

Subinvolution yields readily to this form of treatment. The three cases reported as recovered were all in the early cases. Complete involution very readily takes place, as might well be expected. The case reported as "Improved" went on to complete involution after 32 applications, the other three requiring an average of 24 applications.

Ectropion will not respond to this treatment. It is possible that the cases reported as recovered by Young were not true ectropion, as an error in classification may readily occur unless iodine is applied. In true ectropion, the erosion will not take the iodine stain.

Subacute gonorrhea of the cervix is aggravated by this method, and is a contraindication.

Cases of retroversion, cervicitis, and leucorrhea, a complex commonly observed, respond well, but here, as in general pelvic inflammatory disease, the improvement would be expected to be temporary only. The average time during which there was no appreciable discharge was ten weeks.

The posthysterectomy cervix enlarged, cystic and discharging large amounts of pus and mucus, is a condition too often met with. Most of these patients feel that the surgeon who did their operation has completely failed to better their condition. They believe this because the most annoying symptoms, the same as those for the relief of which they submitted to operation, are still present. The constant backache and discharge are as troublesome as ever. Most of them flatly refuse to go farther with surgical interference, refusing to have an enucleation done, and insist upon some palliative treatment. These cases respond well to multiple incision and aspiratory treatment—in fact, the short time required to bring about a marked difference in the appearance of the cervix is almost unbelievable. No doubt recurrence

of the condition will occur, as it does in all other measures of palliative nature. Complete enucleation should be insisted upon, since the occurrence of carcinoma is high, especially when there is a fibroid uterus.

While my results have not been as good as those reported by Young, I have had comparatively little experience with the procedure. I am convinced that aspiratory hyperemia has a definite place in medical gynecology, and that in suitable cases the results will be better when it is used in conjunction with the usual routine than when it is omitted. Dr. Young's apparatus should be in the office of any physician seeing many gynecologic cases, even though it were used for no other purpose than cleansing the cervical canal before applying medical reagents. No other method will clean the canal as thoroughly and as quickly as one-half a pull on the piston, using the canal tube which is inserted into, instead of covering, the cervix. Better results may follow improvement in technic and experience with cases, and I intend, during the next year, to compare another series of cases with those I have reported at this time.

625 KRESS BUILDING.

LABOR INJURIES TO THE COCCYX AND THEIR TREATMENT.

BY JOHN COOKE HIRST, M.D., F.A.C.S., AND CHARLES WACHS, M.D.,
PHILADELPHIA, PA.

(From the Gynecological Service, Mt. Sinai Hospital.)

INJURY to the coccyx is a not uncommon result of childbirth and its consequences are a source of much annoyance to the patient. The solution of continuity is either an actual fracture of the bone or much more commonly a rupture of the joint between the first and second segments. It can also be produced by falls, kicks or other injuries, and in these cases of single injury it does not cause disability of long duration. Aside from excessive soreness for a few weeks, and a marked disinclination on the patient's part to sit down, few if any symptoms remain after the injury has had a chance to heal. These do not ordinarily give the patient trouble of long duration and require no treatment. The mechanism of the injury, of which the effects are permanent, is as follows: (1) The patient at some time has had a fall or kick upon the buttock, impinging upon the relatively exposed coccyx. (2) This bends the coccyx sharply into the pelvic canal and ruptures the posterior longitudinal ligament of the coccyx. (3) This injury heals in the course of a few weeks, leaving, however, the coccyx permanently bent into the pelvic canal. (4) The patient becomes pregnant, and at delivery the child's head descends into the pelvic canal and is temporarily arrested by the deformed bone. (5) Either

spontaneously or by the application of forceps the coccyx is forcibly bent backwards, the anterior longitudinal ligament is ruptured and the joint between the first and second segments broken. (6) As a result, the firm supports of the coccyx are destroyed and the bone subjected to the pull of the various attached muscles in every direction.

In such a case, the bone can often be heard to snap, as the head forcibly bends it backwards. More often, however, the pain attendant upon the injury is masked by the usual soreness of the whole lower genital tract following labor, and is only recognized at a later examination.

In labor the type of patient who most often suffers this injury is a primipara, with justo minor pelvis, whose coccyx has, in all probability been injured in a former accident and whose labor is terminated by forceps.

If the coccyx is injured for the first time in labor, it commonly heals as does the injury due to a fall, ankylosis slightly backward and not forward into the pelvic canal. By the time of the patient's final examination, six weeks after childbirth, all symptoms of the injury, except the change of direction of the coccyx, have disappeared.

Symptoms.—Usually these are first noticed when the patient leaves her bed, and are commonly as follows:

(1) Inability to sit firmly on both buttocks. The weight is shifted from one side to the other. (2) Inability to sit for any length of time in one position. (3) Inability to rise from the chair, except by using the hands to help elevate the body. The patient usually rises sideways, instead of straight up.

The above symptoms are often ascribed to soreness from perineal stitches, or unhealed vaginal lacerations, or bruising of the pelvic soft parts by the passage of the child's head. As a time goes on, however, the patient complains of the following: (4) Pain on defecation, especially if constipated. (5) Constant soreness at the "tip of the spine," except when standing erect. When sitting down or to a lesser degree when lying down, the pain returns.

Diagnosis is usually made definitely during the routine examination which should be made in every patient at the end of six weeks after confinement, to determine her final condition before discharge. There is no value in making this examination sooner, as nothing could be done during the puerperal convalescence except to give the injured bone a chance to heal spontaneously. The examination required is as follows: (1) The patient is placed in the left lateral position (Sims). (2) The forefinger of one hand, protected by a fingercot or rubber glove is inserted in the rectum. (3) The triangular coccyx is grasped between the forefinger in the rectum and the thumb in the median line externally. (4) The coccyx possesses considerable anteroposterior motility.

If, however, this movement is painful, if the coccyx can be moved *laterally* or above all, if the fragments can be separated so as to make a step or shelf between them the diagnosis of injury can be established.

The x-ray is disappointing in demonstrating coccygeal fracture. Occasionally the break shows, but in the vast majority the injury does not show on the plate.

Terminations of Injury.—(1) Spontaneous ankylosis into the pelvic canal. This leaves the coccyx sharply bent, but the patient is free from symptoms until she has another child, when it is broken again. One patient in our records has recently recovered from her fourth fracture, each time the bone ankylosing inwards. (2) Ankylosis backward in line with the sacrum. In this case, though the bone is firmly fixed, each time the patient sits down, she sits upon the tip of the coccyx, with much the same feeling as sitting upon a large nail, and its removal is required for this reason. (3) Often the line of fracture does not unite at all, due to the constant and varying direction of the pull of the attached muscles, and the fragment remains permanently mobile. This results in permanent painful motility or coccygodynia.

Treatment.—This may be palliative or operative. Every case should be treated palliatively until six months after the injury, to give the bone a chance to ankylose. It may occasionally be necessary to interfere sooner than this, in the event of unusual pain, but ordinarily the patient will welcome the chance of avoiding operation.

It is wise to give the patient, during the waiting period, a placebo to keep her from being discouraged by apparent lack of results. Salicylates or mild sedatives have no effect upon the discomfort and are not worth trying. The pain is rarely sufficient to require active sedatives, being more of a dull constant ache than acute pain. It is our practice to give the patient a mild counter irritant ointment locally, such as 3 per cent iodine ointment. By changing the "flavoring" of this ointment from peppermint to wintergreen, etc., as it seems to lose its effect, the patient can be carried over the necessary period of waiting with a minimum of rebellion on her part. It is purely a placebo, but a necessary one if the patient is to be encouraged in the trying period of inaction. If no ankylosis has occurred in six months after the injury, further palliative treatment is useless. If the patient's symptoms are such as to need relief, the only cure is operation.

During the period of palliative treatment, the patient cannot sit comfortably upon any type of chair. She can be given reasonable relief by an air cushion, however. The circular cushion is useless and gives no relief. The proper one is shaped like a horse-shoe, with the open end at the back. If this is moderately inflated, it will afford a great deal of relief. At times a patient will prefer prolonged use of

the cushion to operation, but this is the exception. The pain and discomfort are so nagging and trying that the patient will usually welcome operation as a means of escaping from them.

Operative Treatment.—A very important warning at this time is that operation should *never* be done for a coccyx which is painful, *unless injury and separation of the fragments can be clearly demonstrated*. If an uninjured but painful coccyx is removed, the pain will not be relieved in any way. The causes of coccygeal pain are (1) injury; (2) reflex from backward displacement of the uterus; (3) rheumatic; (4) neurotic; (5) reflex from hemorrhoids, fistula or fissure. The coccyx is one of the commonest seats for localization of neurotic pain, and it is this type of case that is prone to insist upon operation. Unless the injury can be demonstrated conclusively, this should never be done. Neurotic pain can be diagnosed only by exclusion of all other possible causes. Pain other than that due to injury is most likely to be reflex, and will disappear upon the correction of the remote cause. Rheumatic and neurotic pain are both rare, but do occur at times.

Removal of the coccyx is spoken of as a minor operation, but its difficulties and pitfalls are such that it should be included among the major operations, although the risk to life, with proper technic, is negligible. The steps of a technic which has given satisfactory results are as follows:

1. The patient is prepared as for any other surgical operation, anesthetized and arranged on the table flat on her abdomen, with her head turned well to one side, and the arms straight down the table top and not folded under the chest.

2. The usual drapery is arranged to leave as small an area of skin exposed as consistent with sufficient room to work, and a large, moist pad tucked down between the thighs, covering the labia and perineum.

3. An incision is made in the middle line, from the lower border of the sacrum almost to the tip of the coccyx. The skin and fat are stretched up and down, thus providing for the excision through a smaller incision than would otherwise be possible, and keeping the lower end of the wound as far away from anal contamination as possible.

4. The tip of the coccyx is grasped with a forceps and freed with blunt pointed scissors at its tip, enough to slip the point of the forefinger under it.

5. Aided by the constant upward pressure of the finger, the coccyx is then freed from all its lateral and posterior attachments by scissors. The rectum is just underneath it, and the points of the scissors should always hug the coccyx as closely as possible. This dissection is carried up above the upper limit of the coccyx. The last piece of the sacrum

has two dorsal tubercles but no lateral alae. The first piece of the coccyx has two lateral alae but no dorsal tubercles. If the dissection is carried far enough to expose these easily recognizable landmarks, there is no danger of a piece of the coccyx being left behind. The line of amputation lies between them.

6. A dry small pad is then stuffed under the coccyx, to push and keep the rectum out of the way.

7. With a Gigli wire saw the coccyx is amputated between the alae and tubercles mentioned above. This is most important. The disarticulation can be done with a heavy knife, but not as neatly as with the wire saw. It is *absolutely essential* for the patient's future comfort that the entire coccyx be removed. It is a grave mistake to amputate through the fracture, removing only the movable part. If the first piece is left the patient will not be relieved, and the remaining fragment will have to be removed by a subsequent operation.

8. The only bleeding vessel, the median sacral artery, is now tied with No. 1 chromic catgut.

9. The pad in the wound is removed and the bleeding, which up to this time has been quite free, will have ceased entirely.

10. The wound is then closed by interrupted silkworm gut sutures, so as to obliterate all dead space. This is vital. The needle transfixes the skin and fat at one side of the wound, emerging at the very bottom. It then picks up the fibrous band running on top of the rectum, parallel to its axis, crosses over the rectum, picks up a similar band on the opposite side of the rectum and transfixes the entire thickness of fat and skin on the opposite side of the wound. About five or six of these stitches are needed. Catgut is unsatisfactory, because of the tension. No permanent material cuts as little as silkworm gut, and hence it is to be preferred.

11. Before these stitches are tied, a drain made of three or four strands of silkworm gut, knotted together at either end, is passed under the stitches where they cross the rectum, lying parallel to and just above the rectum and emerges at either end of the wound.

12. The interrupted stitches are then tied.

13. The wound is dressed with sterile gauze and adhesive strips and the patient returned to bed.

Aftertreatment.—The patient lies flat upon her abdomen for the first four days at least. During this time the bowels are kept locked with paregoric, one dram three times a day, and a liquid diet is given, avoiding milk as far as possible. Urine is passed in this position. Except for the first night morphine is not required for pain. The wound is not dressed until after the bowels move on the fifth day, movement being secured by castor oil and oil enemas, and then daily by suitable laxatives. For these movements she is, of course, turned

upon her back and the dressing protected by gauze pads. Contamination of the lower wound is almost impossible to avoid, but it can be minimized. The wound is then dressed daily, and if the dressings are soiled must be dressed several times a day.

The horse-hair drain can be taken out on the fourth day. The silk-worm gut stitches are left in for two weeks, unless the wound becomes badly infected. They always cut in quite deeply and their removal is attended with some difficulty. The end of the stitch is grasped in a hemostat and pulled upward quite forcibly. Often even this does not serve to expose the knot. A small blunt hook is then slipped under the stitch and with this added traction the stitch is brought into view and cut to one side of the knot. Unless it is removed in this way, it is very easy to cut off the knot, leaving the strand of the stitch to retract into the depths of the wound. This means a troublesome sinus, requiring reopening of the wound to remove the offending stitch.

The patient is kept in bed for two weeks, getting up on the day after the stitches are removed. The wound remains sensitive for some time, making sitting down anything but a comfort, but four weeks after the operation, all sensitiveness should have disappeared.

Dangers.—With proper technic and good after care, the danger of the operation should be *nil*. No one can foresee surgical disasters from an intercurrent cause, but if the vital points of the technic are disregarded, serious morbidity and even death may result.

Improper Closure of the Wound.—1. If any dead space is allowed in the wound, it invariably means a hematoma. This easily becomes infected and will usually point on the surface. It is, however, just above the rectum and in the upper angle of the wound the peritoneum is exposed. This hematoma may rupture into the peritoneal cavity, with fatal results. This has occurred in the experience of one of us (J. C. H.), causing the only death we know of. It was due entirely to faulty closure of the wound.

2. Wound infection is common, but fortunately rarely serious. It is usually easily recognized, superficial and easily drained and does not prejudice the final result of the operation.

3. Osteomyelitis of the sacrum is a serious sequel to wound infection—but fortunately rare. One of our cases had this misfortune, resulting in disability for over two years before she was finally cured.

4. Extension of infection into one or both sacroiliac joints is a result of wound infection and extension of osteomyelitis. The joints rarely suppurate, but remain excessively tender for a long time. The patient faces a long stay in bed, with a plaster cast to immobilize the pelvis, and then has to wear a sacroiliac binder for months.

5. Wound sinuses are due to faulty removal of stitches, and mean reopening of the wound to remove the stitch.

6. Perforation of the rectum and fecal fistula may occur primarily from traumatism at the time of operation, or secondarily from infection. The primary wounds can be closed at once and will usually heal. Those due to infection discharge for about two or three weeks and then close spontaneously. They rarely (never in our experience, two patients having secondary fistulae) require operation for closure.

Results.—The objective sought is relief from constant dull aching pain and nagging discomfort. When the injury can be demonstrated beyond question and the operation is really needed, the results are exceedingly gratifying, in that all the symptoms complained of disappear completely and permanently.

If the operation is done for pain referred to the coccyx, without demonstration of injury, the results are *nil*. There is no relief of pain the patient is disgusted and discouraged and the operator, as far as that patient, her family and friends are concerned, suffers considerably in reputation.

The indication for the operation is, therefore, purely symptomatic and elective, but in properly chosen cases, there is no operation in gynecology in which the results are more gratifying.

1823 PINE STREET.

1941 S. NINTH STREET.

Society Transactions

THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SIXTH ANNUAL MEETING

PHILADELPHIA, PA., SEPTEMBER 19-21, 1923.

DR. JOHN W. KEEFE, Providence, R. I., read a paper entitled **Reflections Upon Hospitals.** (For original article see page 144.)

DISCUSSION

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—Hospitals should be as complete as possible in their construction and equipment for the accommodation of patients; but the most important thing to determine is the selling space which such a hospital has, and how much earning power each square foot must have, and what the price of each square foot should be. It can be taken for granted that the rooms are full only three-quarters of the year.

As has been said, a very important point is to have a committee of physicians in consultation with the architect. I know of an instance where for a maternity service the architect arranged for sixteen rooms, each provided with a bathroom. When it was pointed out how infrequently maternity patients took tub-baths during their stay in a hospital, two-thirds of the bathrooms were eliminated, and the capacity of floor space was increased from sixteen to twenty-four beds.

In regard to the nursing problem, there is one feature that can and should be eliminated. The highly specialized nurse whose services can be utilized to great advantage in the operating room should be relieved from the "bed pan" feature of nursing. There should be attendants in every hospital for this work, which takes a great deal of the time of the specially trained nurse.

DR. GEORGE CLARK MOSHER, KANSAS CITY, MISSOURI.—The most important essential for hospitals today is a proper endowment fund, as the great mass of people of a community cannot afford to pay for hospital service. The rich can have whatever they want, and the poor are forced into what they need. The middle class of people cannot afford to pay the expenses of a high priced hospital.

DR. JAMES E. SADLER, Poughkeepsie, N. Y.—Last February I had the honor of being one of three hundred physicians of New York whom the Governor invited in conference to discuss the question of what should be done regarding the lack of physicians in country districts throughout the state. It was interesting to note the views that were brought out. The facts were these: Out of sixty counties in New York state there were actually but four or five that had not been adequately cared for. It was found that cities of the third and fourth class had developed their hospital facilities to such an extent that the country districts were being well provided for. It simply showed that these cities and the people had taken the matter into their own hands.

The question of what was to become of the great overhead cost, that was to be thrust upon cities of the third class that had to look after hospital accommodations for the population of large rural sections, was also brought up at that meeting. For instance, in the district I know best, twelve years ago there were 90 hospital beds in two counties (Dutchess and Putnam) to care for general sickness. Today, with hospitals in the course of construction, there are 545 beds. What is going to happen with the tremendous overhead cost in maintaining such extensive hospitals? Perhaps it might be well if we could hear from the Pennsylvania men about the law that has been in operation there referring to subsidizing the hospitals caring for indigent cases.

DR. DOUGLAS C. MORIARTY, SARATOGA SPRINGS, N. Y.—In many localities we are confronted with the problem of furnishing a building and equipment for a hospital, while the overhead or maintenance expense is entirely forgotten. Dr. Sadler spoke of what is being done in small cities and towns, but a great calamity is presented in that the price is made to meet the running expenses of the institution and the sick are being commercialized. We had fifty or sixty beds in our hospital at Saratoga Springs and could not meet our overhead expense, yet we made a drive for \$100,000 which was successful, so we now have one hundred beds. But if they could not take care of the expense of fifty beds, what are they going to do with one hundred? This addition was thought necessary as by increasing the number of beds, many more people could be taken care of in the obstetric wards. So as I stated, patients are being commercialized and forced to pay beyond their means. The nurses have formed unions, so to speak. They work eight hours, without exception. I believe we may be forced to secure unskilled nurses who will work for a moderate fee, so that the ordinary uncomplicated case can be cared for, with a chief to look after them. This will be a step in advance.

In the ordinary hospital, if there is a difficult case, and the nurses change after so many hours, you have a hard problem to meet. You must have a special nurse for the case; if you have one special nurse, you must have two or three. If we take a man who is only earning \$2,000 or \$3,000 a year and a member of his family has to go to the hospital to receive the care and attention necessary, the expense will be \$150 a week; and if the patient has to stay in the hospital for two or three weeks while the household must be maintained as usual, it surely works a hardship for the individual. I believe the fundamental thing is to look at the hospital problem from that standpoint. It is all right to talk about the doctors being on the Board. I have been on the Board, and the members of our Board of Managers are fond of their own doctor. A doctor in a hospital never resigns and seldom dies, so the matter is generally in the hands of one or two men. I was one of the pioneers in our hospital in 1904, and many of us are still there. In a small hospital one should look after the overhead expense.

DR. EDWARD A. WEISS, PITTSBURGH, PENNSYLVANIA.—I should like to emphasize the last paragraph of Dr. Keefe's paper. We, as physicians, should arouse ourselves and take an active part in solving hospital problems. We may discuss this question for days and not get anywhere. Hospitals do not know our views and it is very essential for us to go before hospital organizations and voice our opinions to the authorities. Possibly many of you may not know that there are two or three large organizations, the largest one being the American Hospital Association, which meets annually to discuss various hospital questions. For years they have been urging physicians to attend their meetings and join in their discussions. I have attended these meetings for the last ten years, and the number of physicians present has been very small. Dr. Keefe has presented a subject that is timely and

while not immediately associated with obstetrics and gynecology, at the same time it is plain that physicians should have more to do with the administration of hospitals than in the past.

DR. JEROME M. LYNCH, NEW YORK CITY.—It seems to me that Doctor Mosher is correct when he states that the crux of the whole situation is the proper endowment of hospitals. St. Bartholomew's, New York, is unique in that it never hesitates in cases of emergency, regardless of the fact whether the patient can pay or not, to supply a critically ill patient with a night and day nurse. I have had experiences in many hospitals within the last twenty-five years and I have yet to see any hospital, except St. Bartholomew's, where the patient is the first consideration. Nearly all the patients on leaving the Hospital speak in the highest terms of the treatment they have received at the hands of the nurses and superintendent.

DR. MAGNUS A. TATE, CINCINNATI, OHIO.—Recently we had a meeting in Cincinnati for the purpose of making a drive for some \$600,000.00 with which to put up a new building. At this meeting were invited the men who send cases to the hospital, and they asked us to give expression of our views as to what we thought a modern hospital should be like, and what we thought were the essentials to make it a hospital working for humanity. This was about the consensus of opinion of some 60 doctors who were present: the building should be compact; it should do away with beautiful lawns, marble halls and other things that are attended with unnecessary expenditures of money; there should be one part in which to care for patients in moderate circumstances. We have wards in which patients now pay \$10.00 to \$25.00 a week, a fee for the operating room, and from \$10.00 to \$25.00 for the anesthetic. How can a member of the family of a man who is earning say a salary of \$2,000.00 a year, a respectable, decent, honest citizen, go to one of our private hospitals?

REV. THOMAS A. HYDE, SUPERINTENDENT OF CHRIST'S HOSPITAL, JERSEY CITY, NEW JERSEY (by invitation).—I share the views of the last speaker who spoke of the average man and the ordinary middle class type of people. I think today in your particular department you are the most important men of the entire staff. I do not know of any place where we are having so much good work done for humanity as we are in the maternity department, and I am referring now to average people. In every other department of hospital work, we know that the surgeon is fairly well placed; he is usually able to collect his fee, but in a modern hospital—at least in our hospital—I find women going to clinics who are able to pay for services rendered to them. I believe we have reached a time when in this particular department we should make an arrangement between the obstetrician and the hospital for the collection of his fee. There are hundreds of people going out of hospitals who are able to pay a fee to the obstetrician, yet they are coming in as poor patients and not paying any part of the attendant's bill. If we have attending obstetricians they must be paid for their services. I feel the importance of this because in our particular city we have come to some new arrangement regarding the admission of average people who go to clinics, in order to provide remuneration for the attending obstetrician.

Dr. Keefe raised a number of important questions but did not answer a great many. After all, we have to settle each particular problem in our own particular city, and I wonder if it is possible to build a modern hospital away from the center of population, away from the cross roads and cities and get out in the country. I doubt it. I believe, despite the smoke, noise, soot, etc., in our big cities, we have to build our hospitals where the people are. It seems to me that has been a progressive step in the great cities, and we must keep near the poor people.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—I wish to speak of one phase of this subject which has not yet been discussed. In each hospital there are two types of bookkeeping, one of which might be designated as the commercial, and the other as the scientific. If any of you have attempted to do clinical research work in hospitals, you will understand the necessity of having the scientific bookkeeping done well. It is found in reviewing a large series of cases that the records are very inadequate in many ways.

Just one other point, in regard to the laboratory. The average laboratory pays the hospital handsomely, where the equipment is adequate to turn out the work. The equipment should be great enough to do a certain amount of research work all the time. If we do not have it this way, whenever the clinician wants any extra work done the technicians cannot do it, because they are so busy turning out routine work which must be done at a certain time. We ought to have one or more workers provided in the laboratory to take care of any research problems of a small or large character. This is essential for doing the most essential of all laboratory work, namely, the clinical research type.

DR. JAMES F. BALDWIN, COLUMBUS, OHIO.—I built a hospital twenty-three years ago which is now the largest hospital in Columbus. We have blue prints for its further enlargement. I have been the presiding genius, or whatever you wish to call it, during all this time. We have a board of trustees, but nothing of importance is done without consultation. We have always aimed to make our charges such that the average man could meet them without serious trouble. We have a large number of rooms at \$4.00 and \$4.50 a day. That includes board, room and ordinary nursing. A large number of nurses are in training. We have the eight hour system and a nurses' home for them, and we treat them as young women of education and refinement. In serious cases special nurses have to be secured, but in ordinary cases nothing of the sort is necessary because we have sufficient pupil nurses.

The location of a hospital is of very great importance, as has been suggested. I do not believe, as the last speaker has said, that you can conduct a hospital out in the country, even though doctors have automobiles and can get to hospitals very easily. The hospital should be centrally located, with reasonably ample grounds, but nothing elaborate. Patients want to get home just as soon as possible after operation, and as one of the speakers remarked (Dr. Speidel) we should do away with all superfluous bathrooms. Most patients want to get home long before they can use a bathtub.

I recently visited the Henry Ford Hospital in Detroit, and found that every room had its bathroom. There are no wards or double rooms, but all are single rooms and exactly alike. It is very satisfactory in many respects, but I approve of small wards, i.e. of 2 to 4 beds. I do not like the idea of having only single rooms for everybody. Many patients must necessarily remain in the hospital for a number of days after operation; the nurse gives them a morning bath, brings their meals to them, attends to the bed pan, and so on, but aside from that it is almost like solitary confinement. We have a number of double rooms, and a few with three and four beds. We put patients in a private room until they are convalescent, then if they wish—as many of them do—they are put in a double room or with two or three other convalescents, and it is delightful to notice the pleasant friendships that are thus frequently formed. They feel better and leave the hospital happy and satisfied. Small wards for convalescent patients are all right, but not for sick patients.

In the Henry Ford Hospital all employees are on a salary, from the chief surgeon to the lowest scullion. The salaries are good. The salary of the chief surgeon

is such that I do not think his position would go begging for five minutes if vacated. There is no worry about fee bills.

It seems to me the time will come, as suggested by a recent writer, when obstetrics will be done by teamwork on the eight hour plan; an obstetrician will be on duty eight hours, after which somebody else goes on. Then they are not in a hurry. Hurry is the bane of obstetric practice. A report was recently issued by the State Board of Health of New Jersey which said that the death rate with doctors attending maternity cases was much larger than that with midwives. It was a source of amazement to me to find that doctors of that state had more maternal deaths, more stillbirths and more infant deaths under one month, than the midwives. It is a shame if it is true, and the only explanation is that the doctor is in too much of a hurry, is too quick with the use of forceps and pituitrin.

A few years ago a former assistant of mine was doing a great many cesarean sections. He went abroad, and when he came back I thought he had been converted from the error of his ways. He said that in Germany among the women whom he examined he found many who, he was sure, would require high forceps or cesarean section; but in the course of time practically all of them had their babies in the old-fashioned way.

One point should be made, as it comes under the head of location of hospitals, and that is the position of the building on the lot. If you will come to Columbus, where we have had for years a recruiting station for the United States, and go to Fort Hayes and visit the government hospital you will be amazed. The hospital is built, as so many are, with a court, but the court opens to the north instead of south. No sun ever gets in there. It is damp and dirty and filled with snow during the winter. The grounds are spacious, and no one knows why the architect did not open the court to the south so as to get the benefit of the sun.

A firm of architects consulted me two or three years ago in regard to a large hospital they were building out in Kansas. I gave them my advice and suggestions and when I got through there was practically nothing left of their plans. They decided to turn the hospital completely around, and to reorganize it from top to bottom.

If you indulge in marble halls, if you have an enormous overhead expense you cannot furnish moderate priced rooms. Much of the expense incidental to the building of hospitals is unnecessary. A hospital should be built substantially, with all necessary comforts for patients. You can then furnish accommodations at \$4.00 or \$5.00 a day as we do.

The essayist spoke of the anesthetist's fee being from \$5.00 to \$20.00. There has to be a change there. Why should we pay the chief of the laboratory department \$5,000.00 or \$6,000.00 a year and allow the anesthetist to collect "all the traffic will bear?" The pathologist has to be a much more capable man than the anesthetist. His position is a most responsible one, and yet we have no trouble in filling this place with competent men. Routine work everywhere should be compensated for by routine salary, and I think it would be wise for all hospitals to place their anesthetists on a salaried basis. Indeed, I am not at all sure but what ultimately the Henry Ford idea will be carried out, and all hospital employees will be placed on salaries, all fees from patients going into the common treasury of the hospital. In that hospital there is a scale of charges for every sort of service rendered, with a specific price for each operation. I think hospital trustees and the profession in general will watch the working out of this idea with much interest.

DR. KEEFE (closing).—One of the reasons I brought this subject before the Association is the fact that you men have standing and position in the various

cities from which you come, and you may be the nucleus of a body which will take greater interest in these various problems. Too frequently the physician is pushed aside by the energetic business man, and unless he looks out sharply, he will be excluded from conferences upon the management of hospitals.

DR. GEORGE F. CHANDLER, Kingston, N. Y., read a paper entitled **Cutting the Ileocecal Fold as a Routine Measure in the Operation of Appendicitis.** (For original article see page 149.)

DISCUSSION

DR. ROBERT T. MORRIS, NEW YORK CITY.—Many patients have symptoms referable to the right side of the abdomen. Often enough inertia of the ascending colon is the factor. Sometimes there is the long cecum described by Wilms that causes trouble. Fibroid degeneration of the appendix commonly disturbs the mechanism of the bowel on the right side. In view of these facts it would be difficult to determine in advance the need for cutting the ileocecal fold. I cut this fold occasionally but have not been impressed with its importance to such a degree as that expressed by Dr. Chandler.

DR. HUGO O. PANTZER, INDIANAPOLIS, INDIANA.—In our investigation of the etiology of disease we are not giving due attention to anatomic irregularities. These occur, both congenital and acquired, in all parts and organs of the body, but congenitally abound in the abdominal cavity. During their embryonal growth in one cavity, the many organs grow each into varying form, size, direction and arrangement, and then, what is particularly distracting, all reach out simultaneously for their part of the common peritoneal covering. No wonder, then, that complications result in displacements, incursions, torsions and disarrangements, involving parts of, or whole, organs.

These anatomic irregularities obviously entail, first, impaired physiologic function, recurring in attacks of varying frequency, until nature establishes a tolerance of them; secondly, they become the seat of infections and their sequelae. In dealing with such cases clinically, we are still remarkably remiss. For instance, when an operation in the adult discloses such congenital imperfections, upon questioning the patient or family, "Has this person been much disturbed in early infancy, and later years," almost invariably, we receive an affirmative answer. I am convinced the time is coming when such cases will be truly recognized and treated in infancy, instead of being attributed to nervous temperament, etc. I would further emphasize, that, as physicians, we should develop the delicate sense of touch of the blind man. This will enable us to outline and detect the sensitive erratic area, better than by the x-ray.

Dr. Morris has spoken of neurasthenia as separately associated with such cases. Neurasthenia here is consequent upon such anatomic conditions, and should be regarded as a symptom rather than as a complicating entity.

DOCTOR JEROME M. LYNCH, NEW YORK CITY.—It is quite possible that there is something in what Doctor Chandler has said; "that it may be occasionally necessary to cut the ileocecal fold because of its interference with the proper closure of the ileocecal sphincter;" but as a routine measure it seems to me dangerous and unnecessary, as in this region the lymphatic supply is abundant. Also, there is some difficulty after cutting this fold in covering up the raw surfaces, and there is also danger that the adhesions following this procedure may nullify the object for which the operation was performed.

DR. ROBERT E. FARR, MINNEAPOLIS, MINNESOTA.—I believe Dr. Chandler is too modest in his statement with regard to the number of cases of chronic appendicitis which are cured. I would put it at about 30 rather than 60 per cent. Coffey investigated a large number of these cases, and says that 70 per cent of them were not cured.

I have nothing to add of a constructive nature excepting perhaps one point in relation to a hobby of my own. I have now something over 100 cases where I had to open the abdomen to determine the condition, and I left it to the patient and applied the physiologic test; in the case of a right ovarian cyst, a chronic appendix, a gall bladder or a chronic appendix in relation to the right half of the abdomen, I have made traction upon the various suspected organs and tissues and have had my patient state whether or not I was reproducing the symptoms. In a surprising number of instances I have been able to obtain most satisfactory results. I have done an operation which has seemed to better meet the indications and I feel that the method is worthy of a further trial.

DR. FRANCIS REDER, ST. LOUIS, MISSOURI.—I am going to dwell only on the diagnosis. Dr. Farr has just referred to a part of this clinical picture. Dr. Pantzer in passing his hand over the abdomen lightly and gently says he is able to diagnose such conditions. Dr. Pantzer may be able to do so, but there are some physicians who may not. I have tried in repeated cases of obscure lesions of the abdomen to determine whether we had to do with an appendix lesion, a gall bladder lesion, or other lesions affecting this clinical syndrome and have not been able to establish a differentiation. However, there is one point that has served me most excellently in determining whether the clinical picture is confined to the right iliac fossa; whether or not I can exclude gall bladder or duodenal lesions. The introduction of the finger into the rectum, hooked over a distinct fold of mucous membrane, known as the valve of O'Beirne, will, upon gentle traction, elicit a pain characteristic of a chronically diseased appendix. The removal of the appendix when this sign is positive invariably cured the patient.

DR. CHARLES P. NOBLE, PHILADELPHIA, PENNSYLVANIA.—I wish to say a few words not so much on the paper itself, as on the principle upon which it rests. In other words, this paper deals with the mechanics of surgery. I believe as long as surgeons continue to be mere mechanics in their thinking, they will never get very far, they will be only better or poorer mechanics. But that is not being a surgeon, because surgery should rest on principles and not on mechanics or mere technic. Operative surgery is merely the details of *how* we operate, not *why*. The main difficulty in the way surgeons have approached their work for years is that they have left out the major premise. In other words, they have been dealing with mechanics, instead of with the principles of surgery. The principle at stake in the paper is: why do not these patients recover when you operate on them? No matter how nice an operation you do, the patient still has the constitution he was born with, and this may have become damaged by local disease. This point has been left out of surgical writings for years.

I was educated before this too limited point of view came into being, and I did not realize what had come about until some ten years ago. The younger members of the profession who have been educated in late years have not been taught what we were taught forty years ago concerning the constitutional factor in disease. They have been dealing only with sickness, when they should have been dealing with sick people. The major premise is the sick man, and in considering merely mechanics, the younger men have left out the major premise from their thinking.

DR. CHANDLER (closing).—I see that Dr. Pantzer agrees with me on anatomic irregularities. Dr. Lynch hates to think nature makes any mistake. I dislike to think so myself, but I have called your attention to the circulation around the rectum as being ideal if we walked on all fours. One person out of every four or five is born with the condition of which I have spoken and the question is what to do for it. I am offering a suggestion.

Dr. Farr quotes Coffey as saying only about 30 per cent of appendicitis cases get well after operation. I claim that the reason for this is because the surgeon did not do the operation I have described. If surgeons performed this operation, a much larger percentage of their patients would get well, and that is the object of my paper.

DR. ROBERT E. FARR, Minneapolis, Minn., presented a paper on **The Use of Local Anesthesia in Handling Septic Conditions Within the Abdomen.** (For original article see page 152.)

DISCUSSION

DR. ROBERT T. MORRIS, New York City.—Personally, I find I have a subconscious sympathy for the patient, and with local anesthesia find myself working more slowly and deliberately than otherwise I would have done. In typhoid perforation, where a complete operation may occupy less than a minute I use local anesthesia, also sometimes for patients with cardiac disease, but for the most part the tendency is to work more slowly and incompletely under local anesthesia.

DR. T. S. WELTON, Brooklyn; N. Y., read a paper entitled **The Time for Operation in Ectopic Gestation.** (For original article see page 158.)

DISCUSSION

DR. ROBERT E. FARR, MINNEAPOLIS, MINNESOTA.—I know that in all cases of severe hemorrhage that are in collapse, the injection of novocain and adrenalin will rapidly improve the condition of the patient. It may be partly due to the fluid, and partly due to the adrenalin and to the novocain. In the cases we have had we have not deferred operation because we have never failed to follow out the technic I have detailed under local anesthesia, and the patient invariably has improved no matter what the condition was in these cases of hemorrhage, unless we had to do a badly traumatizing operation. We simply make an incision in the abdominal wall, check the hemorrhage and do as little operating as possible. We start transfusion at the same time—saline or blood—and make an immediate attack upon the bleeding vessel. I would concur in everything the essayist has said except in the points mentioned.

DR. HERBERT W. HEWITT, DETROIT, MICHIGAN.—Without going into details of the discussion of the delayed versus the immediate operation, I wish to state that it has been my policy for a long time to do the immediate operation in nearly every case, first of all doing blood transfusion. In these days, when the citrate method may be used by any assistant, the transfusion may be given while preparations are being made for the operation. By the time everything is in readiness for the operation the patient is in a much better condition. It is a fact, which I think is known to all, that a patient with ruptured ectopic gestation will stand operation very well. Taking this fact together with the use of blood transfusion, it

seems clear to me that the most advantageous time for operation is the earliest possible moment after diagnosis has been made. I do not believe that anything will be gained by waiting.

DR. OTTO H. SCHWARZ, ST. LOUIS, MISSOURI.—I would like to ask Dr. Welton what type of lesion he found in these so-called tragic cases. In a comparatively small service we have had several very interesting tragic cases recently, and, with one exception, the lesion was located in the isthmus of the tube comparatively early, the period of gestation being eight weeks or less. The lesion in each instance resulted from the fact that the chorionic villi had corroded the tube wall, with very little coagulated blood around the site of the rupture. We obtained two of our specimens from autopsies in outside cases.

DR. CHARLES L. BONIFIELD, CINCINNATI, OHIO.—This is an effort to classify these cases and to bring some law out of a chaotic condition; yet there are a great many cases of ectopic gestation that get well of themselves and are never recognized. I had this point forcibly brought to my attention ten or fifteen years ago. I reported a few cases at the Cincinnati Academy of Medicine, and one of the old doctors asked every one who had had a case of ectopic gestation to hold up his hand, and not 50 per cent of the practitioners present held up their hands and yet every one had had a case of ectopic gestation but had not recognized it. A great many had ruptured, the fetus died, and the patients got along without recognition of the true condition. I agree with Dr. Schwarz regarding the type of cases that die usually with the first hemorrhage. I do not agree with the essayist that there is so much danger attending these cases. His experience has been different from mine. If the patient has her first hemorrhage, provided she is not moved, and in the second place nothing is done to try to elevate the blood pressure too rapidly, she may get along all right. In fact, my advice in these cases has been to do nothing except to give them plenty of morphine. I have had a lot of these patients go five or six days, and to the best of my knowledge I do not regret it. On the other hand, in a large experience extending over many years I have operated on but two cases where there was really active hemorrhage that was dangerous. Just because we have a lot of free blood in the pelvis and can get it out, it does not necessarily mean that the patient is bleeding very much. It means that the patient has bled. If the patient's condition is improving, well and good. Many of them recover, and I not infrequently run across cases a month or two after rupture, and not being sure of what I had to deal with, I have opened the culdesac and cleaned out a lot of clots, and they got well. It is sometimes wise to err on the side of conservatism.

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—There is one point we all lose sight of, i. e., abortion may occur in ectopic pregnancy as it does in intrauterine pregnancy, and as in the latter it may be incomplete or complete. When the abortion is complete the bleeding ceases. When incomplete, the hemorrhage continues. Whether the pregnancy be in the uterus or the tube the analogy is perfect. The type of case Dr. Welton has been discussing is not the kind we meet in office practice, where we make the diagnosis before rupture or after a primary rupture, and operate at our convenience. He is speaking of those severe cases, extremely shocked, that have not died at the time of rupture. Most of these cases rupture several times before the final burst; the first erosion through the tube wall is small, and usually closes by blood clot, or the rupture is into the folds of the broad ligament, when they may go for four or five weeks before they have another rupture. As we do not know when this next rupture will take place, we operate as soon as the diagnosis is made. In the severe cases where the woman is absolutely pulseless,

where there is no pressure, operation turns the balance against her. We transfuse these cases, but we do it coincidentally with the time we place a clamp on the bleeding vessel, and we get results. We do not want to raise blood pressure before we are ready to operate. We want to keep the blood pressure below that point which will blow off the clot. There is a type of ease referred to by Dr. Welton where we sit alongside the patient and watch her minute by minute. The blood pressure shows what is happening, shows whether she is reacting, or whether the bleeding is still going on. If she reacts, it is folly to go in and add trauma to shock, if we can get her back to a point where she is a relatively safe surgical risk.

DR. W. WAYNE BABCOCK, PHILADELPHIA, PENNSYLVANIA.—There is a surgical rule we sometimes forget, which was enunciated by the fathers of surgery, although often omitted from the present day text books, that on the first occurrence of a secondary hemorrhage you may operate; but if the hemorrhage recurs you must operate. This old rule holds good today, and during late years experimental evidence gives added reason why it should be followed. A patient may survive the loss of 20 or 25 ounces of blood but die from a recurrent hemorrhage with the loss of but 6 or 8 ounces of blood. Transfusion is far from being a perfect antidote, for I have seen a patient die from recurrent hemorrhage despite large transfusions of carefully typed blood. Likewise, the experimental animal that may survive an enormous initial bleeding, may the next day or day after die from the loss of perhaps only one-fifth the quantity of blood previously withdrawn. This I think emphasizes the point that we should be very fearful of recurrent secondary hemorrhage, and shows how wise the older surgeons were when they said you must operate and not delay if the hemorrhage returns.

A second point—the impression I have is that vaginal section produces very much less shock, and can be carried out in the patient exsanguinated from ectopic hemorrhage with much less risk than can an abdominal section. For over twelve years those patients whom we felt had the tragic form of ectopic rupture have been brought to the operating room as quickly as possible and the hemorrhage controlled through the vaginal culdesac. These patients have been given spinal anesthesia, which is in line with Dr. Polak's argument, for it also lowers the blood pressure. In the ordinary way we simply thrust a pair of curved scissors through the culdesac, tear the puncture widely open with the fingers, quickly introduce two fingers, or even the hand, into the pelvis, locate and free the bleeding tube, pull it down into the vagina and apply a clamp near the cornu. In two minutes the bleeding may be controlled, and if the patient is pulseless or nearly so, merely introduce gauze through the culdesac beyond the points of the clamp, send the patient back to bed as quickly as possible, raise the foot of the bed and use rest, heat, transfusion, hypodermoclysis or other measures that may seem indicated. We do not take time to remove the blood or clot or to wash out the abdomen; we merely locate, bring into the vagina and clamp the bleeding appendage. If the patient is in fair condition and haste is not imperative, we tie off and excise the affected tube.

After the patient goes back to bed, the liquid and coagulated blood continues to escape through the vagina. As the patient improves, a low Fowler position is used. The abdominal operation is marked by low viability and time is lost, and the patient is shocked as blood and clots are baled, sponged or washed out of the abdomen, and the abdominal contents are exposed and manipulated.

In the vaginal operation the hemorrhage is quickly controlled without exposure or manipulation of the abdominal contents, and without any effort to remove the escaped blood. The clamp may even be applied through the vagina in the patient's

own bed in five minutes time. We had three deaths in about two years time, after abdominal section for ectopic hemorrhage, before we adopted the vaginal method. For twelve years since we have changed our method of treatment, although our service is not large, we have had only one death from ectopic pregnancy, and that patient, although in a very serious condition at the time of operation lived several weeks and died from the effects of the catheter cystitis.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—Just one point that has not been mentioned, in regard to the physiologic adjustment of the fetal and maternal tissue, where the adjustment is not normal, and there is in the history a number of indications. There is quite a difference in the erosion effect of the fetal tissues upon the maternal tissues. I believe that patients who die quickly and have repeated severe hemorrhages are those in whom the maternal tissue does not offer physiologic resistance to the fetal tissue. The indications for treatment are often obtainable from a carefully taken history, and bearing in mind that the wall of the tube is thinned out very decidedly and that there is much corrosion in the cases where this physiologic adjustment has not taken place.

DR. WELTON (closing).—Dr. Farr's method of local anesthesia with adrenaline has great possibilities and is worthy of a thorough trial. Dr. Hewitt speaks of immediate operation and of transfusing all patients. Unless he gets donors quicker than we can, he is not doing an immediate operation but is doing a delayed operation.

Dr. Schwarz asked regarding the common type of lesions in ruptured ectopic, and where they are located. We find most of the lesions located either in the ligamentous or isthmic portion of the tube. There is no coagulation of blood around the lesion due to the chorionic villi. We transfuse these patients coincident with the operation or immediately after the operation.

DR. ROBERT T. MORRIS, New York, N. Y., read a paper entitled **Blindness in Surgery**. (For original article see page 166.)

DISCUSSION

DR. CHARLES P. NOBLE, PHILADELPHIA, PENNSYLVANIA.—It seems to me, that all that Dr. Morris has talked about as instituting a new era in surgery, is contained in Hilton on "Rest and Pain," in principle, if not in detail. That book was published fifty or more years ago. All the remarks about cleaning out milk and letting the patient cure himself has been known since the days of Hippocrates, as the *vis medicatrix naturae*. Ambroise Paré said: "The physician treats, but God heals." Time does not permit me to present properly my ideas regarding what has led to the demonstrated inefficiency of the younger medical men, but it is my opinion that since about 1890 medical education has been miseducation. It has left out a great many things—clinical wisdom and the constitutional factor in disease—and has taught a good deal of the laboratory facts, with a false and exaggerated estimate of their value. I have always used the laboratory in the proper way; but it is not the practice of medicine. It is merely a technical way of getting a quantitative index with reference to certain facts which one ought to know, not the facts themselves. If you are a good clinician you get both a qualitative and a quantitative index more accurately than the laboratory man, as a rule, can approximate it.

DR. MORRIS (closing).—In regard to Dr. Noble's point, every man should do his surgical work as quickly and as skillfully as possible. He should do the

best he can through either a small or large incision. If you believe in making a mackerel incision, do it, but if you have the skill that will allow you to gracefully and naturally make a small incision without shocking the patient at all, then you are doing the best for that patient.

DR. A. J. RONGY, New York, N. Y., read a paper entitled **The Use of X-Ray Therapy in Disturbed Menstruation.** (For original article see page 169.)

DISCUSSION

DR. HENRY SCHMITZ, CHICAGO, ILL.—In our clinic we employ radium as well as x-rays in the treatment of benign hemorrhages of the uterus. Radium is used in the bleeding uteri and the small myomata. The radioactive substances act only on the endometrium; hence they should be used if it is desired to conserve the function of the ovaries. In large myomata, however, we feel that the x-ray is the better treatment. Furthermore, if we treat uterine hemorrhages in younger patients, we can gauge the dose of radium much more accurately than that of the x-ray. The determination of the dosage depends on the kind of normal or abnormal tissue to be treated and on the type of cell in each. The radiation dose may be irritating or stimulating; thereby function is restored and proliferation of tissue stimulated. It is inflammatory when it causes a temporary suppression of function with subsequent restitution to normal; it is destructive or lethal when it destroys function permanently.

In the ovary we probably possess the best organ to study these facts of dosage. The irritating dose stimulates ovulation, and hence on menstruation, the irritating dose causes a temporary amenorrhea, the destructive dose a permanent amenorrhea. These observations may be proved by clinical observation. If we use as the biologic unit of dose the 100 per cent erythema skin dose, which may always be reproduced by using the same source of ray times time of application, and may be controlled by a standardized measuring instrument as an electrometer, intensimeter or iontoquantimeter, then the stimulating ovarian dose is attained by a 10 per cent E. S. D. applied to the ovary; the inflammatory dose by about 25 per cent; and the destructive dose by 30 to 50 per cent of an E. S. D.

When we discuss results of radiation we should mention the exact dosage that was used in these cases, so that other clinicians are enabled to intelligently apply the treatment advocated.

DR. RONGY (closing).—I did not go into details regarding the dosage of radiation for the simple reason that it is not my job. This work is done by the radiologist. Dr. Schmitz is right when he says it is necessary for us to go into details as far as dosage is concerned. It is the unit of the erythematous skin dose established in the patient, which should be the guide. We do not give 10 or 15 per cent of the castration dose. This dose is 35 per cent of the 100 per cent established unit dose, which produces erythema of the skin. These patients receive 25 per cent of the castration dose. A great deal depends also on whether the patient is a thin or stout woman, and how many fields or portals are utilized. If she is a thin woman, we use two portals; if she is a stout woman, we use four portals.

While this work is still in the experimental stage, I believe it is possible to stimulate the ovary so that a woman begins to menstruate regularly, and I think work of this sort ought to be continued and not neglected. The work cannot be done except by an expert radiologist. A gynecologist, unless he becomes a radio-

logist, has no business to dabble in radiology. The expert radiologist has to do this work, and when he does it he will not overstep the bounds.

DR. FRANCIS REDER, St. Louis, Mo., presented a paper entitled *Lesions of the Cervical Stump of a Supravaginally Ablated Uterus*. (For original article see page 173.)

DISCUSSION

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—Three or four years ago I went into this subject very thoroughly because I had a series of cases, all occurring within one year, of malignant changes in the cervix after supracervical hysterectomy. The only work done up to that time was that by Leonard, then a resident of the Johns Hopkins Hospital, which was open to some criticism. I went into the matter by personal correspondence with professional friends throughout America, and succeeded in collecting 256 cases of cancer occurring in the cervical stump after the body of the uterus had been removed for fibromyoma. This seemed rather a large number, and yet at the meeting at New Orleans when I reported these cases, there were 11 additional cases, if I remember rightly, reported by men in the Section on Obstetrics, Gynecology and Abdominal Surgery of the American Medical Association, making a total of 267 instead of 256. My idea of treatment was not that every woman who was operated for a fibromyoma should have supracervical hysterectomy. My contention was that we knew that certain factors predisposed to cancer, and that chronic irritation was one of these factors; that infection was also very common in connection with chronic irritation; and that in Bonney's experience every case of epithelioma of the cervix had been preceded by an endocervicitis. Childbirth was another predisposing factor—therefore if the cervix was infected or extensively traumatized it should be removed.

The question comes up how are we to rid ourselves of this cervix. If the cervix is necessary for the comfort of the woman, there is no question that by taking it out we shorten the vagina. By taking it out we lose some of the lubrication of the vagina. These cases are not so comfortable as when the cervix is left in. If we use the uterosacral ligaments for support as described in the technic of Dr. Baldwin, we do not have prolapse of the vaginal walls. Lately I have handled these cases of extensive infection or extensive trauma by panhysterectomy but in the borderline cases, I have left the cervix and used radium in the cervical canal to prevent cancer from occurring in the stump.

DR. JAMES F. BALDWIN, COLUMBUS, OHIO.—For a good many years, for the reasons advanced by Dr. Polak, I have made it a rule, to which exceptions are very rare, to remove the cervix in cases of hysterectomy. Now and then, in some women with deep pelves, thick abdominal wall, virgins perhaps, with perfectly normal cervixes, I have left the tip of the cervix. Every woman who has had a baby has a traumatized cervix, with scar tissue which is a possible source of trouble.

The technic I have used is simplicity itself. I have made the complete operation over and over again in fifteen minutes and never wounded the bladder or the ureter. I do not see how any one can wound these organs in an uncomplicated case. When we are dealing with cancer we must remove everything widely. I have resected an inch or two of the ureter in cancerous cases, but there is no excuse for injuring the bladder or ureters in ordinary cases, so that this feature can be dismissed entirely; it is a blunder on the part of the operator if either organ is injured. The woman's cervix projects into the vagina to the extent

of three-quarters of an inch; I take that out, but the vagina is not shortened. I have examined hundreds of such women. The vagina cannot prolapse; I do not see how it can be shortened, or how there can be any lack of moisture. I have had cases complain for a while of excessive moisture, but never of lack of moisture or shortening of the vagina.

I have had no fatalities from infection. In these cases I wash out the vagina myself; I do not trust to an assistant or nurse, who might swab it out in a makeshift sort of way. I scrub it out myself with soap and hot water, so that I feel that it is mechanically clean. After I have scrubbed the vagina I catch the cervix with a volsellum, and pass into the cervix the tip of what might be called a large medicine dropper and inject carefully, not using so much force as to go through the fallopian tubes, a number of drops of full strength tincture of iodine. This goes into the uterus, fills it, and part of it runs out. I then flush the vagina with one-fourth strength tincture of iodine. I have thus practically sterilized the vagina and endometrium. Then going in above, the uterus is removed by the technic which I have used in several thousand cases, and which all my colleagues at the hospital have adopted. At the proper time I draw in the round ligaments on each side, shorten them if necessary, put a pursestring suture around the end of the vagina, catching the broad ligament bases and bringing them in. This gives a full length vagina. If the uterus has been low I have really lengthened the vagina, and I have taken away all possibility of cancer of the uterus. I do not know that I have ever had a death from vaginal infection. I do not see how there could be with that technic. I do not think it increases the risk one-tenth of one per cent to take out the cervix.

I personally know of 21 cases of cancer of the cervix following the subtotal removal of the uterus.

DR. HENRY SCHMITZ, CHICAGO, ILL.—It has been stated that carcinoma of the cervix is more common in the married than in the virgin woman. This statement would hold good if there were as many unmarried as married women. Brothers in a recent paper on the study of about 400 pelvic carcinomata, found that 88 per cent occurred in married women. However, if we knew the ratio between the married and unmarried women I think we would change this statement.

A chronically irritated cervix should be removed; it must not be left behind if a hysterectomy is being done. The vagina is carefully suspended by the round and broad ligaments, and if we carefully close the opening of the vagina by inverting the vaginal mucosa into its lumen, we will not have infection.

DR. LOUIS E. PHANEUF, BOSTON, MASSACHUSETTS.—I would like to bring out one point in connection with this discussion. Granting that with a woman in good physical condition, the total removal of the uterus is the ideal operation, we, nevertheless, occasionally run across women who have had a number of children and have lacerated cervixes, and their general condition is such that we fear they would not stand the added shock of a total hysterectomy. My practice with this type of case has been to do a cervical amputation from below, to cover over the raw areas carefully with vaginal mucosa, and then to do a subtotal hysterectomy from above, suspending the small wafer of cervical tissue which is left by the round and infundibulopelvic ligaments. I believe that the performance of a total hysterectomy offers no great difficulty to one who is trained to do the operation. In my mind, the vaginal preparation before the operation is the most important step.

My method of preparation has been to have the patient scrubbed with soap and hot water as carefully as if a vaginal hysterectomy was to be done; the

vagina is then dried and wiped with alcohol. The lacerated cervix is sutured with a running stitch to prevent the escape of any uterine discharge into the peritoneal cavity as the uterus is brought out through the abdomen. Following this the vagina is painted with tincture of iodine, and a strip of gauze one yard long is used to pack the vagina. The end of the strip which is placed against the cervix is saturated with iodine. This pack acts in two ways: in the first place, it raises the cervix higher in the abdominal cavity, thus making the dissection around it easier; and in the second place the vagina is opened over iodine-gauze, and no vaginal secretion enters the abdominal cavity. This preparation has resulted from an experience which I had during my house surgeon days. A woman was operated on before the Clinical Congress of Surgeons some years ago, having a total hysterectomy done for myoma. Previous to the operation she was given a douche following which the vagina was not dried or prepared. I assisted at the operation and during the opening of the vagina, from above, a small amount of the douche water and with it some vaginal secretion entered the abdominal cavity. The woman left the table with a pulse of 80, shortly after this the pulse rose to 150, and she subsequently died of peritonitis. Her death, in my mind, was due to the improper preparation of the vagina.

Again, in operating on a patient who cannot stand the complete hysterectomy because of her physical condition, we may cone out the cervix from above, thus removing all the cervical mucosa. The principle used in the Sturmdorf operation is employed here, but the procedure is reversed, since the coning out of the cervix is done from above, rather than from below.

Following the supravaginal hysterectomy I have been in the habit of suspending the cervical stump by attaching to it the round and infundibulopelvic ligaments. The suspension of the vagina following the complete operation is best accomplished by suturing the round ligaments to the vaginal cuff. The infundibulopelvic ligaments are usually under too great tension if brought down to the vagina.

DR. WM. SEAMAN BAINBRIDGE, NEW YORK CITY.—For about fifteen years it has been my custom, where I left part of the cervix, to follow the method of Bland-Sutton, namely, to remove the mucus-bearing tissue by a wedge-shaped incision to the external os above. I have personally never seen any of my cases return with malignancy.

There is one point on which I must disagree with the essayist. I feel it would be very unfortunate if it went out from this Society that we concur in the belief in a strong hereditary influence in the production of cancer. The facts before us today do not, I believe, warrant as yet any alarm for either profession or public, along this line. While there is undoubtedly an influence, with intensive inbreeding, in the lower animals, as proved by Miss Sehley, of Chicago, and by the Imperial Cancer Research of London, I do not feel that any marked hereditary influence has yet been proved to occur in the human subject.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I do not believe it is the best practice to make a total extirpation of the cervix in every case of fibroid tumor of the uterus. Personally, I have not done so. I have carefully studied and examined my cases and have taken out the cervix when it was hypertrophied and lacerated, and the women have borne children when near the menopause, which the majority of these patients are. I have operated on many hundreds of these patients, and I have never had one case come back with cancer of the cervix. I have no knowledge that any of my patients on whom I have done hysterectomy, have gone to any one else for cancer of the cervix. I think it is good practice

not to make total hysterectomy, unless there is some especial indication for doing so, such as extensive lacerations of the cervix or great hypertrophy or other marked disease present. If any or all of these conditions were present the cervix should be removed.

DR. E. P. SLOAN, BLOOMINGTON, ILLINOIS.—I think the inner shell of the cervix after hysterectomy is a menace. If we examine these patients carefully we will find that ninety-nine out of a hundred have a discharge, all the fibers of the pelvic diaphragm, have their termination in the outer shell of the cervix, and when you cut the ends of these fibers you can never get the natural union you had before. When you coapt them the union is largely of sclerotic tissue which sometimes gives way under tension. I do not see any reason why we should not leave a shell of the cervix, and I see no reason for not removing the inner portion of the cervix. With a narrow bladed knife, with large handle slightly curved and double edged, it is easy to take out a cone-shaped portion of the cervix when a supravaginal amputation is done, and it is easy to remove the same area of tissue with the cautery.

DR. REDER (closing).—I am very glad indeed to be instructed in regard to the cancer situation, but if I have a married woman who has a uterine fibroid and a lacerated cervix, and she tells me that her mother died of cancer of the womb, I am going to perform a panhysterectomy on that woman with her consent.

I was much interested in what Dr. Baldwin said regarding cleansing the vagina of his patients. My difficulty in preventing the shortening of the vagina in a panhysterectomy has been usually the result of improper orientation. I have overcome this to a large extent by taking two volsella with bulbar ends, pinching one in the uppermost corner of the anterior fornix, and the other in the uppermost corner of the posterior fornix. The bulbar end of the volsellum will aid in orientation. I think Dr. Baldwin has convinced us that his technic will prevent shortening of the vagina. When we find that three per cent of all fibroid tumors of the uterus are associated with cancer, it behooves us to give this subject serious thought when we meet with a patient who is suffering with a fibroid tumor.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF MAY 3, 1923

THE PRESIDENT, DR. WM. E. PARKE, IN THE CHAIR

DR. A. HEWSON presented a specimen of **Double Uterus, Double Vagina and Double Douglas' Pouch.**

This specimen was obtained from the dissecting room in a high grade moron of twenty-three years of age, who had died unclaimed and whose family refused to report the antecedent history. The specimen illustrates the persistent remains of the embryologic condition of the pelvis, in that the septum starts as a complete fold of connective tissue covered with peritoneum from the ventral surface of the rectum, dividing the pouch of Douglas into equal parts and continuing forward to the dorsum of the uterus, which was completely separated, down to the position of the intravaginal portion of its neck. The septum then passed between the double uterus to the fornices of the vagina, through and to the vestibule of the vagina, where it appeared as a firm, fibrous septum covered with a mucous membrane directly in the median line. There were only two ovaries, one on each side and in the normal position, as well as two fallopian tubes and two round ligaments, one for each uterus. The ostia were close to the dividing septum, were well marked and the cavity was an inch and a quarter in length. The appearance of the uterus was smaller from side to side, but of the normal length. There were no other deformities present.

DR. J. C. APPLGATE read a paper entitled **Rational Obstetrics from the Teaching Viewpoint.** (For original article see page 181.)

DISCUSSION

DR. EDWARD A. SCHUMANN.—I am heartily in accord with all the general truths Dr. Applegate has enunciated. Obstetrics and internal medicine are the two branches which are common to almost all of us. Surgeons may describe surgical technic for surgeons, serologists may modify their reactions for the benefit of their serology, but when obstetricians describe their procedures it is doctor speaking to doctor, and we may say that any procedure which tends to lessen irksomeness and burdens will find a ready ear in the profession. For that reason we must be exceedingly careful about what procedures we advocate as aids to obstetrics. Now coming definitely to some of those which Dr. Applegate has described, I take it that he discussed in the question of termination of the second stage of labor, or the so-called elimination second stage, only such cases that might presumably be supposed to deliver themselves. The termination of difficult or prolonged labors has no place in this discussion. The technic will apply to the individual case. I feel very strongly, however, that interference with what would otherwise be spontaneous labor, will violate certain surgical principles. In this day and generation when the best surgical minds of the country are condemning vigorously the so-called exploratory laparotomy, unless the indication be very definite, when we are being urged by the American College of Surgeons and the American Hospital Association to eliminate every operative procedure that it is possible to eliminate, when we are taught that every anesthesia carries with it risk

of morbidity and mortality, I think it is a step backward to advocate surgical interference in normal labor. Furthermore, I still believe—apparently this view is old-fashioned—that the cavity of the uterus is an excellent place for the development and multiplication of bacteria. The mortality during convalescence is greater, the deep anesthesia required either for version or the so-called prophylactic forceps operation carries with it certain definite risks. Now in regard to the prophylactic forceps operation of DeLee. From Chicago comes the statement that tocophobia is becoming more and more common and that women fear labor and fear the consequences of childbirth. I firmly believe if I were a Chicago woman and subject to a major, long drawn out operation in delivery I also would have tocophobia. These poor souls are not permitted to deliver themselves, without a serious surgical procedure in addition. Regarding forceps, in my own work and in that of my colleagues, every case delivered by forceps suffers more injury than if forceps had not been used. This applies equally to cases in which episiotomy has been done. I believe that without forceps less injury is done than in the use of forceps. Therefore, I hold that episiotomy with forceps in normal labors is a mutilating operation, and I believe our statistics are not accurate enough to determine the damage to the fetal head. In regard to Potter's work, injuries to the brain are much less frequent in version than in forceps, but I am still to be convinced that fetal mortality is not greatly increased. To summarize, I feel that any unnecessary manipulation is a failure. I believe that the second stage of labor, its troubles and difficulties, are grossly overestimated. With modern methods of narcosis, the second stage of labor offers little trouble in the normal case. When we come to deal with difficult cases, the situation is entirely different.

DR. DANIEL LONGAKER.—The matter of "losing one's head" does occur, and I happen to know of more than one cesarean operation done in search of a lost head, and anyone can tell with what dire results. Criticism was made years ago of a very celebrated and excellent teacher of obstetrics in this city, who was said to use his forceps as skillfully as another would a hypodermic syringe, as a means of relieving pain. I cannot quite agree with the speaker who preceded me regarding the non-expediency of shortening the second stage of labor. Those of us who see much of obstetrics, and when I say see much of it, I mean one, two and three cases a day, contrasting latter day methods of practice with those that prevailed before, we certainly observe a vast amount of uncertainty regarding the duration of the second stage eliminated, and I think with the development of the personal skill that is possible, a vast amount of unnecessary suffering avoided; and likewise a large, a very large and widespread tocophobia. I think if we were in the place of some of these women we would agree with them that we did not want to have another baby very soon. It is pretty hard to resist the pleas of a woman in the throes of labor, when at that time you know that you can safely deliver her. I admit that it is not an easy thing to pass judgment in all cases. In other words, no one can always tell what is going to be a normal case of labor until it is over. You may attempt and fall down in judgment because you have underestimated the size of the head. I do not believe this need mean an increased birth mortality if done by one who has developed such a degree of skill as is easily possible. I think, on the contrary, there are directions in which the birth mortality is going to be lessened. I can tally these cases with those in which the second stage of labor was unduly prolonged, and the baby born dead in consequence. It may be expelled naturally, yes, but cord pressure results and the baby is dead, and a timely version or timely forceps would have saved its life. It is very difficult and wrong to say dogmatically that we must follow a certain line of practice. Every case must be individually studied and individually treated.

Covering my own experience of the last decade, probably the greatest number of mistakes that I have made consisted in failing to do an early elective cesarean operation. Where there is a dead baby our patients are not slow in putting this right up to us: "Doctor, why didn't you do a cesarean operation, you could have saved my baby and saved me a lot of unnecessary suffering." It is very difficult to decide, *but I believe this is the crux of the question*. We are very apt to say that Potter does an unnecessary number of cesarean operations in doing 8 per cent, or more, but it would be very difficult to prove this, just as it would be difficult to prove that we would have had a lessened birth mortality if we adhered to expectant plans of treatment. There is a great deal of fallacy in these figures of birth mortality. When you talk of birth mortality you are talking of the mortality that occurs during the first two weeks. Let an epidemic of colds or pneumonia break out in the nursery and birth mortality will go up. Babies will die and not because they were turned, or were delivered instrumentally, or were born naturally.

DR. CHARLES P. NOBLE.—Perhaps it might be of interest if I should say something concerning the impression which recent tendencies in obstetrics have made upon me. The principle that action and reaction are equal and opposite is generally accepted. Also it is well known that movements in practice are wave-like, gain speed and momentum, reach their height, and then tend to subside rapidly. The teachings of Dr. Potter and Dr. DeLee are the height of the wave of the recent tendency to make obstetrics a surgical specialty, and to disregard the age-long knowledge that, in general, labor is a physiologic process.

One who has had considerable experience with doctors knows that they are as much inclined to follow the latest fad or fashion as the women are in hats. It is perfectly clear that the wave of surgical enthusiasm which has dominated many obstetricians, has its chief danger in the likelihood that they will have numerous imitators of their practice among the rank and file, who have not the skill which lessens the unnecessary risks in the hands of misguided experts. It has been known from ancient times that labor for the majority of women is a physiologic process, accompanied by a minimum of risk to mother and child. To make it a major surgical procedure is contrary, not only to logic, but also to common sense.

When surgical asepsis was applied to obstetric practice it lessened the risks of normal labor to mother and child. Also it lessened the risk of all operative obstetric procedures. This in turn properly induced the broadening of the indications for the recognized obstetric operations. Unfortunately asepsis has made safer not only operations which should be done, but also those which could be done.

If efficiency in medical practice had the same criteria as in commerce and manufacturing, namely, the quantity of the output and the amount of profit, there would be no doubt regarding the efficiency of the methods of Drs. Potter and DeLee. But medicine has other standards, the welfare or highest interests of the patient—in obstetrics, of the mother and child. The physician's interests, financial income, and personal convenience, while legitimate, are subordinate and secondary to that of the mother and child. I can see only one good which the profession will reap from the present surgical wave. There is good ground to believe that Dr. Potter has improved the technic of podalic version. This improvement applied under legitimate indications will be a distinct advantage. I can perceive no such advantage as the result of Dr. DeLee's surgical enthusiasm.

One should add that it is a false assumption that women in general are normal, and therefore should have normal labors. We know it is a fact that probably at least one-third of women are sufficiently undeveloped constitutionally, or whose

vigor is sufficiently deficient from the average, that it cannot be expected that labor should be a physiologic process in them; other women are neurotic; still others are deformed; and so there is a definite group of women who have to be assisted by the obstetrician. But with the great bulk of women, I can see no reason why they should not have their babies as their ancestors had before them, and proceed with their labors satisfactorily.

DR. JOHN A. McGLINN.—Probably the most important subject for discussion is the question of the elimination of the second stage of labor in normal cases. I am not old-fashioned nor do I believe my mind crystallized when I find that I am not in accord with the views of Potter, DeLee and their disciples. It must be remembered that because something is new and interesting that it is not necessarily progressive. The majority of new things which come under the head of reform are not progressive; it is only necessary for some one to put forward a new idea in medicine or religion and he will have scores of followers. We can all recall that following Jennesco's visit to America that patients all over the country were being operated upon under spinal anesthesia; when pubiotomy was in fashion every one laid in needles and saws and were finding any number of causes for the operation. The same thing happened with twilight sleep. These and many other measures were the rage for a time, but they all died a natural death. All of them had elements of good, and the good has remained; the same thing will happen with the measures to eliminate the second stage of labor. Potter has given us an excellent version; the technic will remain, but no one will follow Potter's fashion of doing the operation in every case. I can see no good in the so-called prophylactic forceps operation and I believe that it will soon be forgotten.

DR. NORMAN L. KNIPE.—We have all become a little iconoclastic, and I do not think that Dr. Applegate can possibly mean that we should not accept anything as worth while unless it has been done for the last twenty or twenty-five years. A number of things he mentioned are worthy of discussion. He spoke, for example, of the terrible accidents that often occur during obstetric practice because of the inexperience of the attending obstetrician in an attempt at new procedures—with especial emphasis on the danger of Potter's version. He mentioned one case of version in which the body had been pulled off the head and the head left in the uterus. Now I saw just the opposite thing done with forceps—the head pulled off and the body left behind. Dr. Applegate also advises against teaching students these various procedures for fear they might do them. I have been teaching students the use of forceps for many years and yet realize that forceps are often dangerously misused. But I hear no one advising against a continuance of this teaching. We know of places where atrocious surgical work is done, and yet no one would think of decrying against the teaching of surgery in our medical schools.

So, if a man like Potter has developed the technic of version until it is now a perfected and beautiful procedure, saves the perineum, relieves the patient of most of her pain and gives remarkable results, why not let the students know about it? We do not advise them to do that particular procedure without special training any more than we advise them to take out an appendix without serving a long apprenticeship. I believe Dr. Applegate is misinformed about the mortality record of modern version. Dr. Potter's mortality is only two and one half per cent.

I am rather sorry Dr. Applegate did not bring up another matter. I thought from the title of his paper, that he was going to tell us some new way of teaching obstetrics. It seems to me that most of the teaching in our medical schools at the present time ought to be much better systematized than it is, and I hoped that his paper might touch upon that point.

DR. J. C. APPLGATE, (closing).—In reply to Dr. Schumann, my comparison of injuries to the head referred to the comparison between the cranial and intracranial injuries due to delay in the second stage and the correct application of forceps. I am sure that the cranial injuries due to the use of forceps are greater than when let alone, but not when the correct application is made, and when we are not guilty of incorrectly manipulating them. In answer to Dr. Longaker, he, like Dr. Potter, and many others, knows well how to do version. The point was regarding the wisdom of encouraging this unphysiologic method, simply for the purpose of shortening the second stage, in the hands of the average physician. There is where the danger lies and I am still of the opinion that it is not good practice to convert the normal into the abnormal, nor the physiologic into the pathologic under any circumstances—that the operation should be reserved for those with other definite indications for version.



Fig. 1.

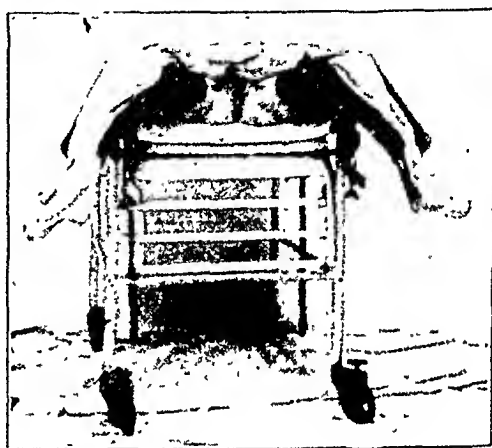


Fig. 2.

DR. J. K. JAFFE presented a paper entitled **A New Method for Teaching Pelvic Diagnosis by Means of Manikins.** (For original article see page 189.)

DISCUSSION

DR. NORMAN L. KNIPE.—The interesting thought occurred to me while Dr. Jaffe was explaining his manikins with Dr. Applegate's paper in mind, how much more important it would be if the teaching might be confined to actual obstetric procedures, such as the different occiput presentations, version, the mechanism of normal and abnormal labors, etc., and not to the teaching of hysterectomies and the more serious gynecologic operations, which are more appropriate for the student's apprenticeship years.

DR. E. B. PIPER presented a set of **Leg Holders for Delivery.**

These will fit any maternity bed and are adjustable to various positions from the exaggerated modified Walcher to the so-called gynecologic. (Figs. 1 and 2.)

He claimed that the tendency to postpartum backache would be largely reduced by this contrivance.

A new gynecologic operating table designed by Dr. B. C. Hirst was also shown.

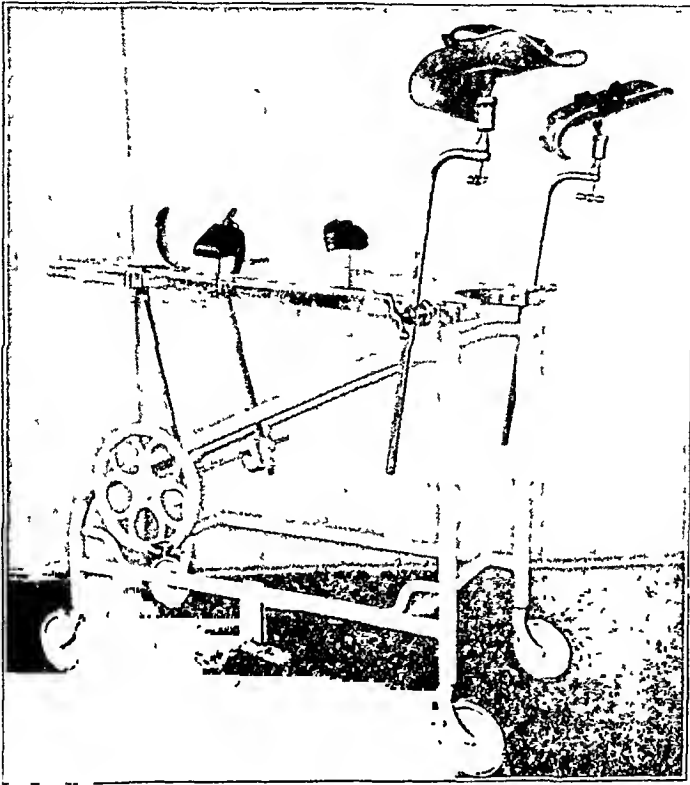


Fig. 3.

(Fig. 3.) This combined the best features of the light American table with the leg supports of the German type. This table can be readily adjusted to the Trendelenburg position, is light in weight, has wristlets and shoulder supports, and proper leg supports.

NEW YORK OBSTETRICAL SOCIETY

MEETING OF OCTOBER 9, 1923

DR. FRANKLIN A. DORMAN IN THE CHAIR

DR. H. N. VINEBERG reported A Case of Interstitial Ectopic Gestation with Unusual Symptoms.

This case possesses an interest, in that it was attended with an unusual complication, that masked very materially the chief pathologic condition, the ectopic pregnancy.

Mrs. A. L. sent for her physician, on January 13, 1923 on account of a sudden attack of pain in the upper right quadrant of the abdomen, radiating to the right and posterior aspect of the body. She had also fainted. The doctor responded promptly, found her in bed, looking very pale and complaining of the aforesaid pain, radiating to the right lumbar region. There was no vaginal bleeding. Looking upon the attack as probably of renal origin, he asked her to void urine and he found it of a distinctly bloody appearance. She was admitted on January 18 to Beth Moses Hospital for observation. The bloody urine persisted for two days. An x-ray of the urinary tract exhibited a shadow in the pelvis of the right kidney. Cystoscopic examination disclosed an obstruction of the right ureter 3 cm. from the ureteral meatus. Catheterization of the left ureter was easy, the catheter passing to the pelvis of the kidney without meeting any obstruction. The diagnosis was made of stricture of the right ureter, and the advice was to slit the ureter at the point of obstruction and effect dilatation.

On January 30 I was asked to see the patient in consultation and obtained the following history. She was thirty-four years of age, had been married three years. Menses set in at the fourteenth year, four weekly type, three days' duration and not attended with pain. She had had four spontaneous miscarriages; the longest period of gestation in any of them was ten weeks and the last one she alleged took place four weeks before the onset of her present trouble. As will be developed later on, it will be evident she was mistaken regarding the occurrence of a miscarriage at that time.

Her physician states, that her last menstrual period occurred October 28, 1922. When she skipped her period in November another physician advised subcutaneous injections presumably of corpus luteum, which he administered weekly to prevent the recurrence of a miscarriage. The last injection was given on December 14, 1922, and on the following day she began to stain; she stained for two days and on the third day she had what she calls a hemorrhage, followed by the discharge of membranous tissue. She was not seen by a physician at that time. She states that following the discharge of the membrane, the bleeding stopped and she felt perfectly well until her present illness.

Following the attack, January 13 she had noticed an occasional stain. At the time of my examination there was no bleeding. The patient had a peculiar pulled look, which she said was natural to her. The abdomen was quite flaccid and not tender at any part. On vaginal examination the uterus was found slightly to the right median line; a small fairly hard nodule, the size of a walnut was felt in the left horn of the uterus. This was not especially tender. Neither tube was thickened, and the ovaries were about the normal size.

The blood showed 76 per cent hemoglobin; red cells 3,400,000; leucocytes

7,000; polynuclear 61 per cent; lymphocytes 39 per cent. The urine had a faint trace of albumin, a few pus cells and an occasional hyaline cast.

I stated the case impressed me as one of ectopic pregnancy, but I will frankly confess that it did not strike me at the time that the nodule, felt in the left horn, was the seat of the ectopic. I rather looked upon it as a fibroid growth. I advised operation but this advice was not accepted. I was asked to see her again, February 4, six days later. The condition had not changed, but the patient was not making any headway. She looked ill and felt weak. I suggested that if they were still opposed to a laparotomy, to permit me to make a vaginal celiotomy for the purpose of exploration. This also was refused; on February 7, three days later, I was again called. In the meantime the patient had been staining off and on and was having more or less pain in the left lower quadrant. The woman was now growing impatient and clamored for relief. The nodule seemed to have increased and was somewhat tender. My advice was now accepted.

On the following day, February 8, I opened the abdomen from above and to my surprise did not find a drop of the blood in the peritoneal cavity. The nodule in the left horn was recognized at once as the seat of the gestation. Its upper and outer aspect presented the characteristic bluish discoloration, the tube was curled about its outer surface and the mass extended into the wall of the uterus, the larger part being internal to the insertion of the round ligament. I made a semicircular incision through the uterine wall, almost at the inner border of the projecting mass, and was able to shell it out without rupturing it. I sutured the cut edges of the uterine wall with catgut, leaving the left ovary *in situ*. The right tube and ovary were normal in appearance and were left as they were. The patient made an uneventful recovery and rapidly gained in strength and weight. I saw her in my office a few days ago; she had menstruated regularly since the operation, looked well and was entirely free from any pelvic symptoms. She still complained of occasional pain and discomfort in the right lumbar region. Enlargement of the right kidney could not be made out.

The unusual features of the case are: (1) The hematuria, the cause of which is still undetermined. The obstruction in the right ureter doubtless may have something to do with it;

(2) The fainting spell in the face of the absence of any blood in the peritoneal cavity. What, therefore, caused it?

(3) How misleading a posterior vaginal section would have been in this case. This does not properly come under the heading of unusual features, but rather under that of instruction.

DISCUSSION

DR. FRANKLIN A. DORMAN.—I would like to ask Dr. Vineberg if he feels this was a progressive thing. If this woman was three months pregnant, how could she have presented a mass only the size of a hen's egg, and if it was not progressive, why didn't it subside by itself? Was there necessity for operation? What were the symptoms that disturbed the woman that made it necessary to perform a laparotomy?

DR. WILLIAM P. HEALY.—I do not recall just what the pathologic microscopic findings were. Were they recorded in the report of the case?

DR. HIRAM N. VINEBERG.—No, they were not made.

DR. WILLIAM P. HEALY.—I should think the question would readily arise as to whether we were not dealing with an adenomyoma. Adenomyomata in the horn of the uterus are not unusual, and even bilateral adenomyomata. I remem-

ber a number of years ago one of those instances in which the horn of the uterus was removed on the diagnosis of an interstitial ectopic gestation, and was sent down to Dr. Williams and Dr. Welch at Johns Hopkins. They reported it was an adenomyoma of the uterus. It would seem to me in the absence of free blood in the peritoneal cavity and the long history which has just been referred to by Dr. Dorman, that one could not very well avoid considering the possibility of adenomyoma as a diagnosis here.

DR. HIRAM N. VINEBERG.—I assumed that when I reported this case as an ectopic pregnancy that it would be accepted as such. I could see the membrane and the little fetus inside the sac as I enucleated it. She had symptoms, she was ill in bed and I considered that sufficient indication to try to get her well.

I had a similar case in the Woman's Hospital. I had made a diagnosis of interstitial ectopic pregnancy, but the family physician would not consent to an operation until the patient herself insisted upon it. It happens often in these cases that there are no symptoms until the third or fourth month; then there is a sudden rupture of the uterus presenting the appearance as if the entire fundus had been blown off.

DR. SAMUEL SWIFT reported a case of Pregnancy Following Nephrectomy.

Mrs. S., age thirty-seven, gravida 1, came to see me on May 16, 1922. She was short, rather stout, and apparently healthy. She had been married nine months and her last menstrual period was March 10, 1922. Her menstrual history was negative. Seventeen years ago she had had her right kidney removed for tuberculosis, and following the operation had spent a year in the Adirondacks. The doctor who performed the operation died several years ago, and no details were available. She had been well since, no other operations, and no serious illnesses. Examination showed heart, lungs and abdomen normal; nulliparous vagina; uterus enlarged to size of two months' pregnancy. I referred her for cystoscopic examination and received the following report: "Normal bladder mucosa. The right ureter was atrophic, the left normal. Catheterized specimen was sterile and negative for tubercle bacilli. The phenosulphonephthalein test gave a reading of 40 per cent elimination of the dye in one-half hour after intravenous injection, which is a high normal for that period when both kidneys are present." During her pregnancy urine remained free from albumin until about five weeks before delivery, when there was a faint trace which persisted until confinement. Her blood pressure varied from 104 to 112, until two days before delivery, when it went up to 120. She was delivered by median forceps, of a seven-pound baby. Her puerperium was uneventful, and when seen by me two months after leaving the hospital, she felt very well; blood pressure was 110; urine negative for albumin, and sterile.

This case certainly bears out Dr. Matthew's statement, that, "Pregnancy after nephrectomy is but little more dangerous to mother or child than pregnancy under normal conditions, provided the remaining kidney is functioning properly."

DISCUSSION

DR. A. H. MORSE.—We have recently had three patients at Yale in whom a normal pregnancy followed a nephrectomy. On the other hand, we had, three years ago, a primiparous woman, thirty-four years of age, upon whom three years previously, a nephrectomy had been done for renal tuberculosis. She had been supervised throughout pregnancy by a physician outside the hospital, and

up to the time of entrance to the clinic gestation had proceeded normally. On admission to the hospital, her systolic blood pressure was 170; the urine contained 5 grams of albumin to the liter. There was a myocardial insufficiency and the patient's breathing was so difficult that it was not possible for her to lie down. It was clear that immediate delivery was necessary. Since it was not possible to give a general anesthetic, we did a cesarean section under novocaine. The interesting point about the case was the fact that almost immediately following delivery the albumin disappeared from the urine and the blood pressure fell to normal. The woman is apparently well at the present time.

DR. JOHN O. POLAK.—One point made by Dr. Matthews was very impressive, namely, that the failure in these pregnancies to bring on symptoms from the kidney was dependent very much on the length of time that had intervened between the nephrectomy and the occurrence of pregnancy. Another point was concerning the disease that the kidney had been removed for—that in the cases of tuberculosis, where there had been no infection, there was less trouble than in the cases where there had been infection. There was less trouble in the cases where there was a longer interval, than in the cases followed by pregnancy shortly after nephrectomy.

DR. WILLIAM M. FORD.—If Dr. Matthews wants one more case to add to his collection, I will cite that of a young lady, now about twenty-eight years old, who had a kidney removed when she was about eighteen years of age. She now has three children, one of whom I delivered, and I assisted at the delivery of the other two. Since then I have taken out her appendix and operated on her perineum and done a retroversion without any difficulty at all. As I said, she is now about twenty-eight, so the interval was not so great after the removal of the kidney.

DR. HIRAM N. VINEBERG.—I think the point Dr. Polak brought out is a very important one, that is, that these cases of tuberculosis which are operated upon go along comfortably. The explanation I think is this: tuberculosis, as a rule is unilateral and the other kidney may be perfectly sound. This, as a rule, does not apply to other diseases of the kidney.

DR. ALBERT M. JUDD described a **New Physical Sign in Interrupted Pregnancy.**

The signs and symptoms of pregnancies have been classified as positive, probable and presumptive. Much has also been written in the last decade regarding interrupted pregnancies, but the end of all in literature on the subject, has been the watchful waiting policy. Nothing has been given us of an absolute, definite nature. We often are asked to give an opinion on a case, the history of which will resemble the following taken at random from among my histories of this type:

Mrs. A. V., age forty-three, married nineteen years, five children, oldest eighteen years and youngest two years; no miscarriages. She was seen on January 10, 1923 with a history of having had the last period in June, 1922; never felt life and wonders why she does not begin to show signs of being pregnant. The physical findings showed an enlargement of the uterus to the size of about a four months' pregnancy and the typical edematous, impressionable uterus which I find is present in all cases of this type. As a variation from this type of history, we find those cases that have felt life, but since a certain stated period the sensation has been no longer present. But, whatever the period of interruption, they all present this typical physical sign: *the pitting of the uterine body similar to that present in the leg when edematous.*

Seeing the case once in the office we say there are the signs and symptoms of a pregnancy, but whereas there has been and exists an amenorrhea of possibly five months or more, and the uterus presents an enlargement of a pregnancy of a shorter time, our usual advice is to wait for one or two months, or possibly for a longer period of time, before determining the final diagnosis. In the meantime we tell the patient and the doctor that we suspect an interrupted pregnancy, and that they may expect that at any time the forces of nature will complete the affair by throwing off the uterine contents. This is trying to all concerned.

By the term "interrupted" here, I do not include any type of a mechanical interruption, but only that type known as "missed abortions."

Two questions naturally come into mind, first, is this good advice if such an interruption has taken place? I know of one case where the patient had an amenorrhea for a period of ten months while awaiting the inevitable abortion. Many others coming under my observation have existed for from four to seven months before a final solution in the way of a miscarriage. It cannot be logical that this is not productive of harm. Second: Is there any existing physical sign which will give us positive assurance that we are dealing with an interruption of a pregnancy?

What I would like to bring to an issue is the very practical question of a definite diagnosis. In reviewing my histories I believe I have found a physical sign of great value. We all know the soft, elastic area found in early pregnancy, brought out and described by Dickinson and Ladinsky. In contradistinction to this, when an interruption has occurred, we have a most striking evidence of a change in the consistency of not only this area but of the entire uterus as a whole. In place of a soft elasticity it now assumes a doughy consistency, taking and retaining the impression of the end of the examining finger just as would a mass of dough. As this takes place the Hegar sign becomes lessened, and as time goes on without the completion of the process the doughiness becomes more pronounced, just as would happen to a mass of dough left exposed and subjected to an evaporation of its moisture.

A trial of this and an observation of its truth for a number of years has convinced me of its value, until I now feel fully justified, if not too early (and our cases seen in consultation are usually not seen early), in making a positive diagnosis of an interrupted pregnancy, and advise its immediate interruption by mechanical means, rather than allow it to go on indefinitely with all the risks of its retention and possibly more serious pathologic changes, such as a development of malignant changes in the decidual tissue.

DISCUSSION

DR. HIRAM N. VINEBERG.—Any sign that depends upon palpation or a difference in consistency of what you are palpating is not pathognomonic. We have heard time and time again statements made by gentlemen at medical society meetings that they could distinguish an ectopic pregnancy by its doughy feel. I have seen those men make mistake after mistake. I do not wish to underestimate the value of Dr. Judd's observation, and it may be of value and I shall bear that in mind, but while I claim to have a fair tactile sense, I must say I do not place a great deal of reliance on that alone. What I do find of value in these cases is that if you question these patients, you will elicit a history of staining for a short time, and it may be only very slight and only a few drops. That to me is a very important sign in these cases of "missed abortion."

I quite agree with the doctor in the statement that it is not perhaps a perfectly safe procedure to let these patients go on until they discharge the contents themselves. I was always of that opinion until I had one case that I kept

under observation, and she developed during that time a hydatid mole, which, of course, carries with it a certain element of danger. However, I must add, and I think you will all bear me out, that mere palpation and determining thereby whether the area is doughy or of different degrees of consistency, is not a perfectly safe guide.

DR. HERMANN GRAD.—I would like to ask the doctor if he uses an anesthetic in these cases to determine this consistency.

DR. ALBERT M. JUDD.—Regarding the anesthetic, I do not use any. Regarding palpation, of course, a man's tactile sense is something that each individual develops for himself.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

NEW BOOKS

BY ROBERT T. FRANK, A.M., M.D., F.A.C.S., DENVER, COLORADO

IN presenting a review of a large number of books, the purpose is not so much to dish up a piquant and entertaining resumé as to provide a reliable digest of what has appeared during the last few months, in order that the right book will find the right reader. Every book contains something worth while, and every volume has weak spots which the reviewer can point out, magnify and hold up to ridicule if he so desires. What the reader wants to know, however, is the main *motive*, impartially given; he cares little either for the publisher's eulogies or the critic's badinage!

The most important book to be considered in this month's Collective Review, is Vignes' "Physiologie Obstétricale."¹ This book ranks in importance with Marshall's "Physiology of Reproduction," Vignes dealing with clinical medicine, Marshall with comparative zoology.

Couvelaire has written the introduction which covers the subjects of human fecundation and the early development of the ovum.

The three main topics developed by Vignes deal with gestation, parturition and the puerperium. The placenta is discussed as an organ of respiratory and nutrient exchange and as an internal secretory gland. The origin of the liquor amnii is regarded as both from maternal and fetal sources. The liver in its relation to the metabolism of the carbohydrates, fats and proteins, the disturbances noted in pregnancy, and the recently devised functional tests, are discussed. Gestation in patients with but one kidney is fully dealt with, both clinical and experimental data being presented. A chapter is devoted to the thyroid, adrenal and hypophysis and their influence during pregnancy. Nutrition and calcium metabolism occupy another. Still another chapter is devoted to the ovary, its influence on nidation, abortion from over- or underfunction, and allied topics. Changes in the heart, circulation, blood and blood-forming organs are next taken up.

It is impossible to give a detailed description even in abbreviated form, of all the topics dealt with, of which the factors which influence the size of the fetus, the causes which produce labor, an outline of the mechanism of labor, inertia of the muscle, effects of oxytoxics, anes-

¹Physiologie Obstétricale. Normale et Pathologique. By H. Vignes, Accoucheur des Hôpitaux de Paris. Préface du Professeur A. Couvelaire. Masson et Cie, Paris, 1922.

thetics and analgesics, puerperal changes and static intraabdominal changes, due to gestation, may be mentioned.

An admirable bibliography of the world's literature appears in the form of footnotes, the most recent articles being included. Each chapter has an appendix consisting of short abstracts of important contributions. The author is to be admired and congratulated upon his wide reading, his facility of incorporating, and especially upon his happy faculty of summing up justly and convincingly.

This modest volume of 456 pages is a real addition to our knowledge of obstetrics. It should prove of immense value to the busy clinician and of great service to the physiologist, who, in its pages, will find summarized much of what is inaccessible in the physiologic literature.

An English translation of this monograph would prove welcome.

"*Biologie und Pathologie des Weibes*"² under the editorship of Halban and Seitz is a huge undertaking, which, if successful, should replace the classic "*Handbook of Gynecology*" edited by Veit, now become almost obsolete. The completed work is to consist of eight volumes, appearing as each installment is finished.

The first installment, which represents the first portion of Volume II, contains 464 pages. The preface declares that this collective treatise will contain everything that has an influence upon the origin and treatment of women's diseases from "the time of conception to the grave." Especial attention will be devoted to the newer serology and bacteriology, to the endocrine glands, to the influence of constitution and heredity. Seventy-five collaborators have been enlisted of which the great majority are German or Austrian. The old guard is conspicuous by its absence, only Ludwig Fränkl, E. Kehrler, Lahm, Menge and Winter appearing. The younger generation has, however, in many instances become favorably known by real achievements.

Installment one contains five articles.

Halban has undertaken the rather thankless task of dealing with general introductory topics.

Polano, in many ways borrows from his excellent work on "*Propädeutics*"³ in his chapter dealing with the technic of gynecologic examinations.

Köhler gives a very detailed description of the drugs used abroad in the cure of gynecologic ailments. Many of these medicaments are unknown to me. The pernicious habit of giving to ethical preparations nonmeaning trade names is steadily increasing. Sixteen different ovarian preparations are mentioned, while countless polyglandular and other forms of medication are discussed as adjuvants for hypoplasia. Corpus luteum, follicle and mammary extracts are recommended for excessive uterine bleeding. A bewildering number of organopreparations are mentioned, the final unjustifiable conclusion being voiced that organ extracts have an identical but nonspecific action. This probably holds true, I believe, of the many valueless

²*Biologie und Pathologie des Weibes. Ein Handbuch der Frauenheilkunde und Geburtshilfe.* Herausgegeben von Josef Halban, Wien, und Ludwig Seitz, Frankfurt a. M., Lieferung 1. Octavo; 288 Seiten; 116 Abbildungen im Text. Berlin und Wien, Urban & Schwarzenberg, 1923.

³*Geburtshilflich-Gynäkologische Propädeutik. Eine Theoretische und Praktische Einführung in die Klinik und in die Untersuchungskurse von Prof. Dr. Osear Polano, Vorstand der Gynäkologischen Universitäts Poliklinik, München. Verlag von Curt Kabitzsch, Leipzig, 1922.*

preparations now employed, some of which may act as foreign protein. The heterogeneous material of this long chapter is made more accessible by the division into classes such as abortifacients, narcotics, local treatment, ferment therapy, etc.

Lindig deals with the new subject of protein therapy. The object of this medication is to increase body resistance by nonspecific means, especially in the presence of infection. He advocates its systematic use in every puerpera who develops a febrile reaction, and recommends it in adnexal disease including that of tuberculous origin.

Seitz devotes 174 pages to the subject of x-ray and radium therapy, in which he has acquired such an enviable reputation. Seventy-five pages are required to describe the physics, armamentarium and biology of the rays. Castration, stimulation of the ovaries, treatment of tumors—fibroids, sarcoma, carcinoma—are discussed. Technique is described with great detail. The last thirty pages are devoted to the use of radium. Seitz's is the best article of the five and is the only one which has a convincing ring to it. The others for some undefinable reason bear an unduly detached and academic stamp.

This monumental undertaking deserves every encouragement possible. I trust that each volume will be graced with a separate index and that the bibliographies in succeeding installments will show greater completeness and care in their preparation.

The third edition of Faure and Siredey's two volume gynecology⁴ is a large and well-balanced textbook, the result of collaboration of a gynecologist and internist. The object of this collaboration was to give due importance to nonoperative methods and not to slight functional derangements. It is questionable whether this object could not be better attained if gynecologists receive broader preliminary training, and in later life do not allow themselves to become narrow and onesided specialists.

The book gives an insight into the best gynecologic practices of the French. The illustrations of operations, printed in two colors, are clear and instructive; the many drawings of microscopic specimens are truly admirable, and six elaborate colored plates adorn the text.

A number of changes would improve the book. Among them I would instance the entire recasting of the chapter dealing with "sclerosis of the ovaries" which is entirely out of date, the incorporation of an effective operation for cystocele, adequate descriptions of adenomyoma, adenomyositis, and a revision of the article on syphilis, with due consideration of dark-field diagnosis. Most pathologists will disagree with the authors that myoma of the uterus may be due to some "dystrophic trouble" resulting mainly from hereditary or "diasthesiques" influences.

The ninth edition of this sterling book by Ribemont-Dessaignes and Le Page,⁵ appears in two volumes aggregating together 1573 pages. Lepage died in 1917 and Ribemont-Dessaignes has delegated the revision to his pupil Le Lorier. The book, though slightly old-fashioned, is replete with an immense amount of information based upon the huge material of the Paris maternity hospitals. Any one desirous of finding

⁴Traité de Gynécologie. Médico-Chirurgicale. By J. L. Faure and A. Siredey. Troisième édition. Chez Gaston Doin, Éditeur à Paris. 1923.

⁵Traité D'Obstétrique. Par MM. A. Ribemont-Dessaignes et G. Lepage, Avec 557 Figures Dans Le Texte Dont 452 dessinées par Ribemont-Dessaignes. Neuvième édition. Revue et mise à jour par V. Le Lorier; Masson et Cie; Éditeurs, Paris, 1923.

references to the older, basic researches and casuistic in obstetrics, can consult this treatise.

It is to be hoped that this valuable book will be saved from premature oblivion by a thorough revision in a future edition.

A third edition of Pfaundler and Schlossmann's "*Handbuch der Kinderheilkunde*"⁶ is appearing. This book is well known to American pediatricians because of a translation of the second edition, which was edited in 1912 by Shaw and La Fetra. In order to avoid mere emendation and revision, subjects have been reassigned, so that no previous collaborator has the subject he dealt with in former editions.

The first volume, which as yet has alone been completed, contains a general introduction dealing with the history of pediatrics, the biology of early development, mortality and morbidity of childhood, examination, prophylaxis, pediatric pharmacology and child culture.

A series of chapters are devoted to the physiology of nutrition and metabolism, another to the special pathology of the newborn, the premature and the child arrived at puberty. More than two hundred pages are devoted to diatheses and general diseases among which are included status lymphaticus and diabetes mellitus, in spite of the fact that the last portion of the book covers the pathology of the endocrine glands.

The large format, good paper, excellent illustrations and wonderful colored plates, together with marginal index make this noteworthy book pleasant reading.

Some specially interesting topics deserve emphasis. Schlossmann deals in great detail and with much clearness with the hygiene of children's asylums, schools and other institutions. The development and anatomy of the breast written by v. Jaschke is excellent. Rietschel does not approve of the v. Pirquet system based on the "Nem." As the nutrition of children is today a burning economic and medical question in Germany, much attention has been devoted to this topic (Rietschel E. Müller). The plates illustrating the pathology of premature children, as described by Ylppö of Helsingfors, are superb. Apparently insulin is as yet unknown in Germany. Wieland of Basel has written an instructive chapter on thyroid diseases. He prefers whole gland tablets to either thyreiodin, thyroglobulin or thyroxin for substitution therapy, and, like most careful internists, is doubtful as to whether operative treatment of exophthalmic goiter is really justified. Fischl concludes that the thymus has no endocrine function.

The first volume of this Handbook is most worthwhile and should appeal equally to the general practitioner, for whom it is primarily written, to the pediatrician and obstetrician.

The underlying purpose of Lahm's monograph⁷ is to place the pathologic anatomy of women's diseases before the general practitioner in such a guise that it will impress him as a live, essential study and not, as so frequently happens, as a lifeless, colorless theoretic and

⁶*Handbuch der Kinderheilkunde*. Ein Buch für den praktischen Arzt. Herausgegeben von Prof. Dr. M. von Pfaundler und Prof. Dr. A. Schlossmann, 4 Bände mit ca. 100 meist farbigen Tafeln und ca. 500 Textfiguren. I. Band, 2. Auflage mit 18 Tafeln und 198 Textfiguren. Verlag von F. C. W. Vogel, Leipzig, 1923.

⁷*Die Pathologisch-Anatomischen Grundlagen der Frauenkrankheiten*, 24 Fortbildungsvorträge aus dem Gesamtgebiet der Gynäkologie von Professor Dr. Wilhelm Lahm, Vorstand des Laboratoriums der Staatlichen Frauenklinik zu Dresden. Mit 71 Abbildungen auf XXII Tafeln und im Text. Verlag von Theodor Steinkopff, Dresden und Leipzig, 1923.

purely academic luxury. The book is based upon twenty-four lectures arranged for short postgraduate instruction.

Under "fluor" he discusses vaginal, cervical, corporal and salpingitic infections, but classifies gonorrhea and tuberculosis separately. The rationale of fluor-therapy is discussed at length and resorcin recommended. Pain in gynecology, the etiology of new growths, the nervous system of the pelvic organs and gynecologic hemorrhages are some of the topics treated in an original and incisive fashion. He places follicle rupture during the midinterval. His classification of ovarian tumors is that of Pfannenstiel.

The book is clear, short, simply written and a useful guide to right thinking in gynecology.

In contrast to the preceding volume McCann's book⁸ appears to have been written under the somewhat obsolete conception that the general practitioner insists that his information be obviously practical and concentrated, and also punctuated with numerous ponderous prescriptions.

In spite of a distinct prejudice engendered by the above mentioned methods of presentation, I will confess that the perusal of McCann's book proved both pleasurable and profitable. Its pages are replete with valuable information concisely put. A conservative standpoint, tinctured by good judgment and wide experience, appears throughout. The author professes a touching confidence in ichthyol. He advises operation in backward displacements which produce no symptoms, and approves of emptying the uterus in septic abortion, none of which views is shared by me.

From across the Atlantic comes a modest volume containing the Transactions of the Edinburgh Obstetrical Society for 1922.⁹ The presidential address mentions the death of two men well known in gynecology, namely, David Berry Hart and Francis W. N. Haultain. Of the twelve papers printed I have space to refer to only two, the one casuistic by H. S. Davidson on "A Case of Ovarian Dermoid rupturing into the Bowel during Labour," the other by James Young "A Further Study of an Organism Obtained from Cancerous Growths." Young concludes that carcinoma, lymphosarcoma and leukemia are due to an infecting organism of the colityphoid group. This work resembles that of Russel, Sanfelice, Leopold, Nuzum and many others, none of which is conclusive.

The next four books to be taken up throw sidelights, from various angles, upon the subject of sex. Magian's sensible, restrained and sympathetic presentation carries the widest appeal of the four, at least to me.

Miss Ettie Rout's book¹⁰ is an appeal to women to make marriage safe. "The control of fecundity and the control of infection are parallel problems." She very clearly indicates the measures to be taken by both women and men, the latter based on the experience gained among the British and Anzac forces during the World War. The increase of danger due to alcoholic indulgence is emphasized. The

⁸The Treatment of Common Female Ailments. By Frederick John McCann, M.D. 121m., M.R.C.P. London, F.R.C.S. England, Surgeon to In-Patients Samaritan Free Hospital for Women, London, etc., etc. Edward Arnold Co., London, 1922.

⁹Transactions of the Edinburgh Obstetrical Society. Session 1921-1922, Volume xiii. Oliver and Boyd, Tweeddale Court, Edinburgh, 1922.

¹⁰Safe Marriage. A Return to Sanity, by Ettie A. Rout. With Preface by Sir William Arbuthnot Lane, Bart., C. B., M. S. William Heinemann, London: 1922.

book is entirely free from cant, amateurishness or false viewpoint of sex. She states that birth control of the responsible classes allows "the responsible being out-bred by the irresponsible." In spite of an almost deadly earnestness throughout, a note of humor has crept into the footnote which ends—"The worst feature of the British Empire is that there are too many Englishmen and not enough Anzaes."

Magian's "Sex Problems in Women,"¹¹ endeavors to enlighten the general practitioner upon the many delicate questions which are constantly submitted to him, and to aid him in treating conditions which he constantly encounters. The book is written by a well balanced, but not a hide-bound conservative, who knows human nature, who recognizes the value of Freudian doctrines, but refuses to assign every impulse to the *sex motive*. Sound medicine, sound psychology and good common sense are to be found in these pages, quite free from the admixture of pornography so commonly tinging such literature. This book is to be recommended.

Liepmann's book¹² is a study of "synthetic sexual psychologic development" in the form of ten lectures. The course at the outset attracted one hundred auditors. Before the end the audience had increased to seven hundred. This does not surprise me when the subjects presented are considered.

The contents deals with procreation from the ameba up, touches upon the development of the female sex organs from a bisexual *Anlage*, mentions chromosomal inheritance, Weissmann's hypothesis and Mendel's theory. The male plasma possesses the procreative urge and the female protoplasm is guided by selectiveness. Physiologically, woman is more vulnerable because of the communication of the fallopian tubes with the abdominal cavity and because of the monthly follicle rupture. Biologically, woman is inhibited and passive, but more irritable and reactive than the male.

The importance of the five senses in eroticism is graphically described. Operative intervention such as the mikä operation, infibulation, etc., are discussed; the origin of tatooing, dancing, music, etc., and their influence on sexuality are mentioned. Infantile pre-puberty sexualism, dualism in love, aberrations, etc., are not omitted. The book is well written, shows wide knowledge of the subject, at times places poetry above accuracy, and often emphasizes phases of the subject which require no mention to a nonmedical audience. The confessions of his auditors, both male and female, which occupy the last hundred pages of the volume, are not edifying. As a psychology the book does not impress me greatly; as a pathology of sex it has its value.

Stekel's¹³ conception of frigidity is that of a psychoanalyst. To him dyspareunia signifies frigidity and absence of orgasm, upon which he places the highest significance. Apparently neurasthenia, infantil-

¹¹Sex Problems in Women. By A. C. Magian, M.D., Gynæcologist to the Manchester French Hospital; Médaille De La Réconnaissance Française, Médaille Du Roi Albert. William Heinemann, London, 1922.

¹²Psychologie der Frau. Versuch einer synthetischen, sexual-psychologischen Entwicklungslehre in Zehn Vorlesungen, gehalten an der Friedrich-Wilhelms-Universität zu Berlin, von W. Liepmann. Zweite, umgearbeitete Auflage, Verlag von Urban & Schwarzenberg, Berlin und Wien, 1922.

¹³Die Geschlechtskälte der Frau. (Eine Psychopathologie des Weiblichen Liebeslebens.) von Dr. Wilhelm Stekel, Nervenarzt in Wien. Zweite, verbesserte und vermehrte Auflage. Urban & Schwarzenberg, Berlin und Wien: 1921.

ism, unconscious homosexuality play the major rôle. The importance of Freud's sexual trauma of childhood has been greatly exaggerated according to Stekel; more often such shocks are sustained between the seventeenth and twenty-fourth years of life. Many interesting topics are treated in an interesting way, such as the "spoiling" of an only child, the distant love shown to *matinée* idols, the sudden development of a latent dementia *precox* after sex trauma. There is a constant fight between the infantile and anti-infantile, sexual and antisexual, physical and soul, and such conflicts in the neurasthenie produce disease. A wealth of well written case histories are included. The book is an important contribution and well worth reading even by those not in full accord with its conclusions.

Sampson¹⁴ has given us a practical book, in which technical verbiage has been reduced to a minimum, to furnish the doctor or staffs of institutions just starting physiotherapy with proved, good methods. Physiotherapy is justly termed the human salvage service, and only too often physical methods have been neglected, derided and allowed to drift into the hands of the quack. Perhaps in consequence of repeated attacks Sampson adopts a defensive attitude which is unnecessary.

All methods of physiotherapy are discussed. Especial usefulness is credited to diathermia, static modalities and ultraviolet rays. The treatment of acute and chronic x-ray burns is given in great detail.

One of the main values of this book is the minute care with which technical details are described, as the author justly emphasizes, upon which depend the subsequent success or failure. The author has had a huge experience in the war and post-war reconstruction hospitals. On the whole, though enthusiastic, his claims appear well substantiated. I cannot agree, however, with either the view or the verbiage which implies that in large white kidney, combination of diathermia, static condenser discharge and fractional doses of x-ray will "stop further destruction by damping out the '*itis*.'"

The next book¹⁵ is written with a diametrically opposite aim to that of the preceding: v. Seuffert has written a textbook describing the physical, biological and clinical foundation of deep-ray therapy in gynecology in order to enable gynecologists, who do not practice radiotherapy, to advise their patients intelligently. The text in great detail delves into the theory, especially of measurement of quantity, and describes all the new methods elaborated at Erlangen and Freiburg. Any one interested in sterilization, treatment of fibroids, sarcoma and carcinoma of the uterus and other pelvic conditions such as tuberculous salpingitis will find instructive reading in these pages.

Blomfield¹⁶ deals acceptably with the entire field of anesthesia. He prefers the C. E. mixture (chloroform-ether) for abdominal work, and regards nitrous oxide-oxygen as best where the vitality is at a

¹⁴Physiotherapy Technic. A Manual of Applied Physics. By C. M. Sampson, M.D. With Eighty-five Illustrations. C. V. Mosby Company, St. Louis, 1922.

¹⁵Lehrbuch der Physikalischen, Biologischen und Klinischen Grundlagen zur Strahlen-Tiefen-Therapie und Ihrer Anwendung in der Gynäkologie. Von Prof. Dr. Ernst von Seuffert, Med. Rat der Hebammen-Schule in München Mit einem Geleitwort von Geh.-Rat Prof. Dr. A. Döderlein. Mit 77 Abbildungen im Text und 21 Tafeln. Berlin 1922, Verlag von S. Karger.

¹⁶Anaesthetics in Practice and Theory. A Textbook for Practitioners and Students. By J. Blomfield, O. B. E., M.D. (Cantab.), Senior Anaesthetist to St. George's Hospital and Lecturer on Anaesthetics to the Medical School. Chicago Medical Book Co., Chicago, 1922.

low ebb. His chapter on the choice of anesthetics is most instructive. He warns half jocularly that in the future the barometric pressure may have to be considered in the airship hospital when narcotizing a patient.

Peritz¹⁷ presents the subject of the internal secretions from the clinical standpoint for the practitioner and student. The cardinal diseases are described clearly. As is readily understood, when dealing with a specialty still in the formative stage, many assertions are debatable and many opinions will require revision. The descriptions of the causes of homosexuality and infantilism are most interesting. Biedl's¹⁸ monograph represents a *Referat* prepared for the thirty-fourth German Congress of Internal Medicine in 1922. The booklet gives a good generalization of the pathologic changes in and the clinical manifestations resulting from pituitary disturbance.

Biedl believes that the hypophysis is necessary for the maintenance of life. He prescribes anterior lobe extract, and accepts tethelin as a potent remedy, although all newer researches discredit both these products. He also quotes Goetsch's repeatedly discredited experiments on the influence of anterior pituitary extracts on the development of the sex glands.

Reed's¹⁹ obstetrics for nurses is valuable for the classroom, and yet also adequate for postgraduate reference. The book is pleasant and simple in its presentation, does not attempt to make a physician of the nurse, but gives her worth while and true information.

He is correct in stating that an obstetric nurse should specialize. His advice on page 177 is as valuable as the admonitions of Polonius to his son, and I shall transcribe it verbatim.

"Any patient who is at all reasonable can be managed by a tactful nurse without the consciousness of being opposed or directed. Gossip, hospital stories, criticism of other cases, other nurses, or of doctors should be avoided. The patient is deeply interested in her own case, and the private troubles of the nurse do not concern her nor enlist her attention for more than a few polite but unpleasant moments."

May all nurses read these words, take the advice to heart and practice it.

Sauer²⁰ has written a short nursery guide of which the first one hundred and twenty-three pages deal with the care and hygiene of the infant, the next chapter takes up the common ailments, and the final chapter covers the care of the sick infant. The book is brief, to the point and well gotten up.

Chapin's²¹ excellent and well written book is interesting reading.

¹⁷Einführung in die Klinik der Inneren Sekretion, von Prof. Dr. G. Peritz, Nervenarzt in Berlin. Mit 31 Abbildungen. Verlag von S. Karger, Berlin, 1923.

¹⁸Physiologie und Pathologie der Hypophyse. Referat von Prof. Dr. Arthur Biedl. Prag. Verlag von J. F. Bergmann, München und Wiesbaden, 1922.

¹⁹Obstetrics for Nurses. By Charles B. Reed, M.D., Obstetrician to Wesley Memorial Hospital, Chicago. One Hundred Forty-four Illustrations Including Two Color Plates. C. V. Mosby Company, St. Louis, 1923.

²⁰Nursery Guide for Mothers and Nurses. By Louis W. Sauer, M.A. M.D., Senior Attending Pediatrician, Evanston Hospital; formerly Attending Physician Chicago Infant Welfare, and Assistant Attending Physician Children's Memorial Hospital, Chicago, Illustrated C. V. Mosby Company, St. Louis, 1923.

²¹Heredity and Child Culture. By Henry Dwight Chapin, M.D., President of the Children's Welfare Federation of New York; Medical Director of the Speedwell Society; Emeritus Professor of Medicine (Diseases of Children) at the New York Post-Graduate Medical School and Hospital; Ex-president of the American Pediatric Society. With a Foreword by Professor Henry Fairfield Osborn. E. P. Dutton & Company, New York.

The future of the world depends on the child more than ever in this shell-shocked age, so that "infant salvage" assumes great importance. He decries the "hopeless determinism" of biologists and inclines toward Conklin's view that a relatively poor inheritance with excellent environmental conditions often produces better results than a good inheritance with poor conditions. Social inheritance plays a huge rôle. This is the experience of accomplishments of past generations handed down. The "primitives" are those left behind. Quality, not quantity, is to be sought in children. The book mirrors the mature reflections of a clinician who has not forgotten how to think and generalize.

Of its kind, a "Student's Aid" to Gynecology, Tottenham's²² small pocket-sized book is not bad. What I am looking for is a moderate sized and priced textbook, instead of the usual bulging encyclopedic tome, a golden mean between the useless epitome and the verbose hand books now current. The student's curriculum is so crowded that the wheat must be sifted from the chaff before it is offered to the learner.

At the instigation of the Medical Research Council Burn and Dale²³ have studied the subject of standardizing pituitary extracts. They recommend the general adoption of a theoretical strength of 10 per cent fresh infundibular substance as laid down by the U. S. Pharmacopeia. At best even this standard is variable. Of preparations on the market variations in strength from one to eighty, as measured by the oxytocic strength, were found.

²²*Aids to Gynaecology*. By Richard E. Tottenham, B.A., M.D., B.Ch., B.A.O., D.P.H. (Univ. of Dublin), F.R.C.P.I. Censor and Examiner in Midwifery, R.C.P.I.; Fellow of the Royal Academy of Medicine, Ireland; Late Assistant Master, Rotunda Hospital; Late Examiner for the Licence in Midwifery, R.C.P.I.; Assistant Pathologist to Dr. Steevens' Hospital. Sixth Edition. William Wood & Company, New York, 1923.

²³Medical Research Council. Reports on Biological Standards, I. Pituitary Extracts. By J. H. Burn, M.A., M.B. and H. H. Dale, C.B.E., M.D., F.R.S., Published by his Majesty's Stationery Office London 1922.

Selected Abstracts

Sterility

Gibbons, R. A.: Sterility with Reference to the State. *British Medical Journal*, March 18, 1922, p. 427.

From 1840 to 1880 the birth rate of England and Wales was about stationary at 35 per thousand. In 1897 the birth rate was about 29.7 per thousand. Since 1917 the rate has been between 17 and 18 per thousand. The percentage of illegitimate births to total births in England and Wales is about 4 to 5 per cent, in Scotland about 7 per cent, in Ireland 2 to 3 per cent. About 45 per cent of illegitimate children were born to domestic servants. During the first year of their lives about 0.99 per cent of legitimate, but 9.1 per cent of illegitimate children died. The birth rate has fallen in most of the European countries, being most abnormally low in France. Among the so-called intellectual class, the average number of children per marriage was less than two. The compilation of statistics by Dr. Jacques Bertillon shows that the largest number of children are born to the classes lowest in the social scale. Economic analyses have proved that the birth rate falls as the income increases. "The gospel of comfort" is a great factor in the reduction of the birth rate. The writer mentions the importance of abortions, stillbirths, and deaths due to congenital causes. He believes that every man and woman should have medical examination before marriage. Gonorrhea is probably responsible for 50 per cent of absolute and relative sterility in women. Syphilis influences infant mortality, since probably about one-fifth to one-fourth of abortions and stillbirths are due to this cause. He concludes that definite arrangements should be made for conserving the lives of illegitimate children. Secondly, he believes in compulsory notification of gonorrhea and syphilis. Third, he thinks that ultimately we must not expect an average of more than two births from each marriage. In view of the fact that four children per marriage is necessary to maintain population, the problem of race suicide is one of the not too distant future.

F. L. ADAIR.

Evans, H. M., and Bishop, K. S.: On the Relations Between Fertility and Nutrition. *Journal of Metabolic Research*, 1922, i, 335.

These authors made extensive experiments on rats, involving several hundred individuals and covering a period of two years. They found that by feeding a balanced diet, but in limited amount, it was possible to stunt the growth of young animals. Depending somewhat on the degree of underfeeding, the estrous cycle either did not appear at all or at more or less protracted intervals. On the whole, the greater stunting resulted in the more marked disturbance of the ovulation rhythm.

A carbohydrate-free diet which was otherwise ample, affected neither the growth nor the sex physiology. The absence of fat from the diet affected the growth and, more especially, the sexual development of the animals. In both cases the results varied according to the amount of protein administered. Animals reared on a diet low in protein were badly stunted and the estrous cycle was badly interfered with.

While a diet poor in salts did not materially affect the growth of the rats, it did have a disastrous effect on the sexual function. Absence of the several vitamins had a similar effect. Feeding only a single article of food, such as

boiled beef or milk, also affected the sexual development to a much greater extent than the rate of growth. In short, the work of these authors seems to show that rats reared on any defective or insufficient diet, may have a normal rate of growth and yet their fecundity and fertility be markedly interfered with even without any upset of the ovulation rate. Should the latter occur, the impairment is a grave one.

R. E. WOBUS.

Macomber, D.: Defective Diet as a Cause of Sterility: Final Report of Fertility Studies in the Albino Rat. *Journal American Medical Association*, 1923, lxxx, 978.

Macomber, working with Reynolds, carried out experiments with rats to determine the effect of different diets on breeding and sterility. They were able to produce a complete sterility in a certain number of the animals. No changes in the ovaries or testicles were found in these animals. Further experiments proved that in some of the cases of sterility, the question of breeding played a marked rôle, for by remating the supposedly sterile animals to highly fertile partners, they were able to cause reproduction. Therefore, they speak of relative fertility in these artificially produced sterile rats. They conclude that there may be great individual variation in fertilities and such variation is increased by in-breeding and by deficient diet. They speak of a certain level of fertility as the threshold of reproduction, and the results of mating are dependent on whether the animals are above or below this level.

W. KERWIN.

Evans, H. M., and Bishop, K. S.: Existence of a Hitherto Unknown Dietary Factor Essential for Reproduction. *Journal American Medical Association*, 1923, lxxx, 889.

Experiments carried out by these workers show the effect of vitaminic diet on fertility and on the fate of the implanted ovum in the guinea pig. A very careful selection of animals was made and several different diets were used. Several hundred experiments were conducted. Each animal had a previous trial gestation to rule out an existing sterility. The animals were subjected to intercourse and checks were made as to the occurrence of fertilization by the use of the placental sign. By dietary control they could cause either sterility, or death of the embryo in utero, or bring the animals to term with live offspring. Many foods were experimented with to cure the dietary sterility. Oil extracts of these foods were used to 100 mg. per day and cures obtained.

W. KERWIN.

Novak: Diagnosis of the Patency of the Tubes by the Rubin Test. *Wiener Klinische Wochenschrift*, 1922, xxxv, 789.

The technic used is that described by Rubin. The author has tried the method in 21 cases in which the most careful examination did not reveal any cause for sterility. In 11 of these the husbands were examined and found to be normal. Sixteen cases had a primary and five a secondary sterility. In 12 the result of the inflation was controlled by x-ray which agreed with the result shown by the manometer. Ten came to laparotomy, nine of which showed conditions agreeing with the Rubin test, while in the other no cause could be found for the tubes not being permeable to the gas. The author feels that the test is valuable in the diagnosis and prognosis of such cases.

FRANK A. PEMBERTON.

Furniss: The Rubin Test Simplified. *Surgery, Gynecology and Obstetrics*, 1921, xxxiii, 567.

Instead of using the continuous flow of carbon dioxide for testing the patency of the fallopian tubes as used by Rubin and others, Furniss inflates the tubes by

means of a 30 c.c. glass syringe. By means of a T-tube he connects the manometer between the syringe and cannula. The syringe is filled with CO₂ from a tank, allowing the gas to displace the piston. In order to detect cervical leakage, the patient is placed in the Trendelenburg position and the vagina filled with water after the cannula is introduced; thus any escape of gas would be detected by bubbles rising in the water. As the capacity of uterus and tubes varies between 5 and 15 c.c., Furniss argues that an excess amount of gas over 30 c.c. is superfluous.

R. E. WOBUS.

Winter: Causes and Treatment of Sterility in the Female. Deutsche Medizinische Wochenschrift, 1921, xlvii, 733, 765 and 797.

Winter finds he is much more frequently consulted regarding sterility than formerly. He ascribes this, not to an actual increase in the condition, but to an awakening consciousness among married couples that sterility is an abnormal state. The physician has also taken a more active interest in this condition, which he formerly regarded as more or less hopeless.

In the past, the woman was nearly always thought to be at fault, but in late years the man has come in for his share of the blame, which is not inconsiderable. Various investigators found azoospermia in from 25 to 33 per cent of husbands examined, and oligospermia in from 11 to 25 per cent. To these groups, Winter adds cases of necrospermia, in which the spermatozoa are either dead or very sluggish.

As absolute causes of sterility in the female, Winter enumerates severe tubal infections and ovarian atrophy. Other causes, such as stenotic os, malpositions and infantile uterus, he considers as only relative. These causes include almost every gynecologic condition, wherefore, a most thorough examination must be made and one after the other excluded. He divides his cases into primary (virginal) sterility and secondary sterility, following previous conception and tabulates 155 cases in which the cause was determined as follows:

CAUSE	PRIMARY STERILITY PER CENT	SECONDARY STERILITY PER CENT
Infantilism	12	
Stenotic os	30	6
Malpositions	20	
Perineal tears		35
Adnexal diseases	20	23
Catarrhal conditions	14	20
Para- and perimetritis		15

He analyzes the various possible causes of sterility and suggests appropriate treatment. Since various ovarian extracts are capable of producing menstruation in hypofunction of the ovary, he advises their employment in certain cases, as well as thyroid and other organ extracts, but adds that their use is still in the experimental stage. He does not mention hyperacidity of the secretions nor undernourishment as causes. The results of treatment are admittedly discouraging. Of 22 cases treated for sterility which he was able to follow up, only six women, or 27 per cent conceived. In the successful cases the presumable cause of the sterility was endometritis in two, colpitis in one, stenotic internal os in two instances, while in one case the cause was not ascertained.

R. E. WOBUS.

Rongy: Primary Sterility. New York Medical Journal, 1922, cxvi, 439.

The author bases his study upon an analysis of 400 private cases. This experience has resulted in very great pessimism. He feels that our entire conception of the etiology and treatment of primary as well as relative sterility is erroneous and, furthermore, that in many instances our present methods of treatment tend to induce permanent sterility. The old mechanical theory of sterility is still widely accepted, as is proved by the fact that in nearly 75 per cent of the cases under consideration, the patients have had from one to six operations performed for the cure of sterility, yet they still remain sterile. Later, the internal secretory derangements came into prominence, and numerous combinations of glandular extracts were recommended in the treatment of this condition. Yet, after a fair trial of these new remedies, it was found that they were falling short of the claims made for them, and that in spite of this treatment, a large proportion of the sterile patients still remained sterile.

The importance of the male factor in sterility has undergone a great change in the past decade. In a paper published in 1911, the author found that a man was at fault in nearly 30 per cent of cases, and this coincided with the experience of a number of observers at that time. In the present series, the man was at fault in less than 11 per cent of cases. The author ascribes this change to the educational campaigns conducted by the medical profession and various public health agencies, which have resulted in a marked decrease in gonorrhea and all its complications. After many elaborate investigations, the author concludes that we must pronounce the man well if the examination of a condom specimen shows fully formed and viable spermatozoa.

A number of the author's patients were inseminated in the uterine cavity, yet not one of these became pregnant, and from this the author concludes that if the problem of sterility is to be solved at all, it will have to be investigated from a purely biologic and chemical viewpoint. X-ray examinations of the bony pelvis of sterile women were found of no value, nor were blood groupings of patient and husband. Diet control, even when resulting in marked reduction of weight, did not influence sterility. The exanthematous diseases during childhood seemed to have been of some importance, and it was the author's impression that there was a greater prevalence of sterility among the women who, during their infancy, or childhood, had troublesome throat infections, and also that women who had had scarlet fever complicated by severe kidney disturbances are not so likely to become pregnant as those who had simple uncomplicated scarlet fever. The author believes that scarlet fever or diphtheria may prevent the ovary from properly developing and possibly at the same time cause permanent structural changes.

The fact that 6 of 36 untreated cases subsequently became pregnant is the best illustration that sterility is often temporary in nature and that in a certain number of women some readjustment takes place and pregnancy ensues.

Displacements of the cervix and uterus play a very small rôle in the etiology of sterility. The only findings which are more or less important are, first, a small infantile body of the uterus, associated usually with a small conical cervix, and frequently found in women who are fair, somewhat stout, and have an irregular menstruation; second, a large hard uterine body with a long hypertrophied cervix with a history of rather profuse menstruation, usually found in the tall dark masculine type of woman. Such findings indicate a most unfavorable prognosis and such patients, if left alone, have a better chance to become pregnant than if operated, for the various operations performed on them often result in closure of the fallopian tubes, with permanent sterility.

Plastic operations on the tubes hold out very little hope for the cure of sterility. The author has delivered only two women in all his obstetric experience who had had

such operations. Six cases insufflated after such operations all showed closed tubes. Insufflation at frequent intervals following operation may in the future prevent such closure, yet the author believes that patients with tubal infection stand a better chance without operation. In cases with fibroid tumors in which insufflation shows open tubes, the author does not advise operative intervention unless acute symptoms develop, for such women are more likely to become pregnant between the ages of 30 and 40 than between 20 and 30, and something may be gained by waiting.

The stem pessary is discarded by the author as inefficient and dangerous since it may set up an acute inflammation.

The author describes the peritoneal insufflation method of Rubin, and feels that it should be employed as a diagnostic measure in all cases of sterility in which there does not exist a definite contraindication. In certain cases, it appears also to have therapeutic value, since in a number of patients who had long been sterile pregnancy followed almost immediately. The author feels that in these cases the force of the gas may either have expelled some mucous plugs from the tubes or straightened out some kinking along their course.

MARGARET SCHULZE.

Maier: Correction of Sterility. *Pennsylvania Medical Journal*, 1923, xxv, 78.

Sterility is no longer considered a condition peculiar to women. Detailed study of a case without knowing the functional status of the husband is useless. Repeated examination of condom specimens should be made before the anatomic condition of the female is considered. Infections of the cervix must be cleared up. Indiscriminate dilatation and curettage is to be condemned. Frequently infection of the cervix has been carried into the uterus by this procedure. The patency of the tubes is determined by Rubin's inflation. Women with malpositions, relaxed outlet or short vaginal walls are often unable to retain semen. This is corrected by tampon, elevation of the hips after intercourse, pessary etc.

Regulation of the sexual life will usually remove pelvic congestion. Diets low in protein, such as are now in vogue in Europe, lower the rate of fecundity. Endocrine disturbances such as hypothyroidism or hypopituitarism with resulting genital atrophy and disturbances of menstruation or amenorrhoea, must be considered. In the matter of gland therapy, small doses of thyroid extract when combined with corpus luteum activate the latter hormone. Especially is this combination of value in the treatment of habitual abortion.

In the operative treatment of tubal inflammation and cystic disease of the ovary, pronounced conservatism must be the rule. The mere separation of adhesions about the tubal ostium frequently leads to a happy outcome. Ries has shown by histologic study that pyosalpingitis and hydrosalpingitis can be cured. In the handling of cystic ovaries, resection of the involved portion with correction of the frequently associated malposition of the uterus is sufficient.

H. W. SHUTTER.

Schmidt, H. R.: Sterility in Women and the Outlook of its Treatment. *Medizinische Klinik*, 1922, xviii, 722.

In from one-third to one-fourth of all the cases of sterility the husband is at fault, gonorrhea being the greatest etiologic factor. In women, sterility is attributable in one-third of the cases to gonorrhea and in two-thirds to infantilism. Patients with gonorrhea should not be subjected to intrauterine therapy lest there result a salpingitis from an ascending infection. For the mild cases, especially those with hydrosalpinx, salpingostomy may help.

Faulty development of the genitalia, which is the cause of much sterility, is usually limited to an infantile condition of the vaginal vault and cervix. Where the anterior vaginal wall is short, no spermatozoa are to be found in the vaginal

secretion and in the cervix a few hours after intercourse. Spermatozoa may also be prevented from gaining access to the uterine cavity because of changes in the external and internal os and because of faulty deviation of the cervix.

The prognosis is worst in the cases where the uterus is atrophic and the menses occur at long intervals. In the patients in whom the uterus and adnexa are normal and the menses regular, the fault appears to be a stenosis of the external or internal os. The method which gives the best results in these cases is that of Fehling's slow dilatation of the cervix. This consists of the insertion into the cervical canal of a slightly bent, thin glass tube 5 cm. long. This tube is changed two or three times at three-day intervals and before each change the uterine cavity is irrigated with 1 per cent formalin. Among 56 cases treated at the Lund clinic by this method, 15 (27 per cent) became pregnant, and at the Bonn clinic of 31 patients treated this way 11 became pregnant, an incidence of 35.5 per cent. J. P. GREENHILL.

Graff: The Treatment of Sterility in Women. Wiener klinische Wochenschrift, 1923, xxxvi, 38.

Twenty-five per cent of cases of sterility are due to lack of or fault with the spermatozoa. Most cases of primary sterility in women are due to hypoplasia of the genital organs, while most cases of secondary sterility are caused by inflammatory changes; 54 per cent of all are due to the former. The treatment of hypoplasia should have the objective of developing the genital organ by regular coitus, heat by means of baths to induce hyperemia, and the use of iron and arsenic.

Disturbances of menstruation such as menorrhagia, amenorrhoea, and metrorrhagia may be found. The causes of these may be classified as follows: (a) general diseases such as anemia, diabetes, heart trouble, etc.; (b) disturbances of function of the hypophysis or thyroid; (c) disturbances of ovarian function due to small cystic degeneration and faults in corpus luteum formation. The treatment of group (a) is obvious. In group (b) hyperactivity of the thyroid causes decreased menstruation while menorrhagia is characteristic of myxedematous conditions. Castration by operation or radiation allows domination by the thyroid and may result in the outbreak of exophthalmic goiter. The treatment depends on the gland at fault. In the third group x-ray treatment is the best for profuse bleeding. Many cases of normal pregnancy have been reported following it. The function of the ovary may be improved by giving ovarian extract especially in conjunction with thyroid extract.

Retroversion of the uterus may cause sterility if the cervix is directed against the anterior vaginal wall. In general it is overemphasized as a cause.

Sterility is caused by inflammatory processes in 17 per cent of the author's material. In most of these there was salpingitis. Pneumoperitoneum by the Rubin method is an important aid in the diagnosis. Seventy-two per cent of cases having a diagnosis of salpingitis by palpation had closed tubes by this test.

Sterility may be caused by "sperm-immunity" as the experiments of Dittler show that it can be caused in guinea pigs by the intravenous injection of semen, and Waldstein and Eekler have found sperm-protein in the blood serum of the female guinea pig after cohabitation. Facts in favor of this theory are: the professional sterility of prostitutes; sterility resulting from frequent intercourse; immediate pregnancy after long abstinence, for instance "war pregnancy"; and the relative frequency of pregnancy occurring after menstruation. Vogt claims that the blood serum of a sterile married woman agglutinates the spermatozoa of her husband.

FRANK A. PEMBERTON.

Vogt, E.: New Facts and Problems in Sperm Immunity. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxii, 373.

By sperm immunity is meant the production of temporary sterility by means of extragenital introduction of sperm (subcutaneous, intravenous or intraperitoneal). From animal experimentation, hypotheses are made concerning sperm immunity in the human and these elucidate certain cases of otherwise unexplainable sterility.

From observations on animals it has been shown that sperm is absorbed chiefly by the uterine mucosa, while absorption from the vagina, tubes or peritoneum has not been proved. There is anatomical and biological proof that the wealth of glands in the uterine endometrium serve for more than the imbedding of an ovum. In dogs Marschall has seen sperm not only in the uterine cavity, but also deep in the glands. In sheep and in guinea pigs the sperm immediately enters the uterine cavity and not the vagina. In mice, sperm cells are autolyzed within 8 hours after emission and the uterine mucosa resembles tonsillar tissue.

Since only one spermatozoon is necessary for fertilization, the rest of the spermatozoa with their high degree of differentiation and marked specificity do not simply disappear but are absorbed. In recent times many phenomena have been reported which are attributed to the biological activities of the absorbed sperm. While this may be true, Vogt believes that some of the phenomena may be explained by vasomotor activity, by psychic or psychosexual influences.

J. P. GREENHILL.

Linzenmeier: The X-ray as Treatment for Sterility. *Zentralblatt für Gynäkologie*, 1922, xxxix, 1560.

Linzenmeier admits the paradox of using a method for the treatment of sterility which was formerly used to promote the same condition, but claims that a difference in dose has a markedly different effect upon the follicles of the ovary.

Reports are given of two cases: A woman, aged 26, who on account of profuse bleeding at her periods and severe dysmenorrhea, ultimately came for treatment with x-ray, and one year later gave birth to a perfectly normal healthy child. The second case was a woman, married three years without children, who for twelve years had suffered from menstruation every fourteen days, profuse and very painful. She, too, had been treated ineffectually in the usual ways, rest in bed, hot injections, gland extracts, and eventually with formalin vapor. Eventually she was treated with deep x-ray. One year later she gave birth to a normal child, and, indeed, was eight months pregnant for the second time at the time of the report. Linzenmeier notes the association of sterility with altered menstruation, and offers the suggestion that the alteration in the uterine mucosa is due to a too quick ripening of the follicles. With the slower rate of ripening the menstruation became more normal and conception was possible. The radiation of human beings seems not to have resulted in the tendency to fetal abnormality noted in the lower animals. Eight earlier cases in the literature have been noted of pregnancy after these treatments without abnormality.

LITTLE.

Guggenberger, J.: The Viability of Human Spermatozoa in Vitro. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1922, lix, 22.

An attempt was made to study spermatozoa *in vitro* from a practical point of view. It was found that bacteria destroy the motility of spermatozoa and, therefore, in doing artificial insemination it is essential that sterile spermatozoa be obtained. While there are bacteria in the vagina, the few spermatozoa which successfully reach the uterine cavity are free of bacteria. This is due first, to the

fact that they have not remained long in the vagina and secondly, in their passage through the cervical plug, all adherent bacteria are removed. Sterile spermatozoa may be kept actively motile for 14 days, whereas those contaminated with bacteria live only 24 to 36 hours. To obtain sterile spermatozoa, the external urethral orifice and the glans should be washed with alcohol and a sterile condom with a special cap should be used. After the specimen is obtained, the cap is tied off and the condom removed. For insemination, only a minimal amount and preferably diluted with sodium chloride and filtered, should be used. The most favorable temperature for keeping spermatozoa alive is room temperature. The pressure of the syringe at the time of injection does not harm the sperm, and it was found that they live longer in daylight than in the dark.

J. P. GREENHILL.

Steinhäuser, W.: *The Biological Behavior of Spermatozoa to Contraceptive Substances*. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxiii, 146.

The author studied the effects of the common contraceptive substances on human spermatozoa. Twenty-eight different solutions and suppositories were investigated. Immediately after ejaculation, the spermatozoa were mixed with physiological saline solution at body temperature. In this way the spermatozoa remained in perfect condition for one-half hour; but after this, the number of live spermatozoa decreased until after two and one-half hours only very few were motile. It was found that undiluted vinegar killed all the spermatozoa within ten seconds. When the vinegar was diluted, 1 ounce to 1 liter of water at 37° C., all the spermatozoa ceased motion within 15 seconds. In an 8 per cent solution of liq. alum. acet. no effect on the spermatozoa was seen at the end of 30 seconds. After one minute about half the sperm were dead and at the end of two minutes all were motionless. A 10 per cent solution of tartaric acid killed all the sperm within 15 seconds. In 4 per cent boric acid solution all motility ceased after 8 to 10 seconds and in 2 per cent quinine hydrochloride all activity ceased after 15 seconds. Three per cent formalin was effective after 25 to 30 seconds. A 5 per cent solution of sodium bicarbonate and a 1 per cent solution of hydrarg. oxycyanide killed the sperm in 4 to 5 seconds.

Bichloride of mercury even in solution of 1:100,000 killed the sperm in 10 to 15 seconds. Even after 5 minutes a 10 per cent solution of tannin and 10 per cent zinc sulphate did not kill all the sperm. A 10 per cent solution of citric acid had little effect until after 5 minutes. On the other hand, distilled water killed all the spermatozoa within 10 seconds. Likewise tap water at 37°C. killed all the sperm within 10 seconds.

The author also reported the results with a number of vaginal suppositories, all of which are proprietary preparations. However, with the exception of two, the spermaticidal solutions were much more effective than tablets, pessaries, pastes, etc. In using a solution, at least one-third of a liter should be used shortly before coitus and two-thirds within 3 minutes post-coitum.

J. P. GREENHILL.

Baumann: *On the Question of Artificial Impregnation*. *Schweizerische medizinische Wochenschrift*, 1922, lii, 373.

The author is writing this article to warn against the use of cervical drain after the technic of Nassauer. He reports 16 cases in which he used the drain for either dysmenorrhea or sterility. In the cases where the drain was allowed to remain seven weeks there resulted a hemorrhagic purulent discharge and even in cases of only two or three weeks' action there was a marked irritation. Eleven of the sixteen cases showed disturbances such as erosion or ulcer of the cervix, ulcer of the vaginal walls or a widespread endometritis. The type of instrument seemed to have no particular bearing on the result, but probably the bacterial content of

the vagina was increased by the manipulation and irritation of the instrumentation. The disturbance seemed to be more severe in multiparas than in primiparas. Instead of beneficial results rather there occurred erosion with resulting scar formation of the cervix and vaginal walls with stenoses worse than before. The author reports four cases wherein he used the method for sterility with poor results and concludes that the drain may be of use in painful menstruation but is of no use in sterility. Because of the dangers attending its use it should only be employed with a full appreciation of the possible bad and severe reactions after its introduction.

A. C. WILLIAMSON.

Belot, J.: Sterility and X-rays. *La Presse Médicale*, 1923, No. 58, p. 642.

It is a well established fact that x-rays can produce azoospermia in the male and follicular degeneration of the ovaries in the female, but these results are permanent only if large doses of the rays are administered. Whenever intact spermatogones or follicles are left, function will be restored. He reminds us that it is very difficult to obtain permanent amenorrhea in young women by this means, and that in the ray treatment of fibroids, it is often necessary to repeat the exposure. Total sterility can no doubt be produced by direct irradiation, but the dose varies with different individuals and is hard to determine.

From Germany total azoospermia in x-ray laboratory workers has been reported, but in order for the report to be of value, these workers should be removed from the influence of the rays and studied later to determine whether the sterility is permanent. The author has made inquiries among over 300 of his colleagues in x-ray work. He finds that the percentage of childless homes is not larger among them than among other physicians. In 12 who have practiced this specialty continuously for many years (one for 19 years before marriage) he found no cases of sterility, even though the protective devices used were far from being efficient; the number of their children varied from one to seven. Two of them who developed azoospermia became fertile a few months after beginning the use of rather elementary protection. Their children were physically not inferior to others of their ages. In his laboratory are several female attendants who are exposed to the rays all day long. One of them has had three full term pregnancies (with living, healthy children), and one miscarriage (due to over-exertion) within four years. Another has had one child and is pregnant again. Another has been married one year, but is sterile on account of a gynecologic disorder.

The author hopes that others who have observed similar facts will publish them and thus aid in discrediting this popular fallacy.

E. L. KING.

Pust: A Useful Pregnancy Preventive. *Deutsche medizinische Wochenschrift*, 1923, xlix, 592.

Pregnancy is contraindicated in some cases of constitutional disease. There are chemical and mechanical means of prevention. The former consist of the use of suppositories and douches containing various drugs. The latter include condoms, caps of various kinds to fit over the cervix and stem pessaries. The author has devised an instrument consisting of a glass button which fits against the outside of the cervix. This is perforated so that a loop of three strands of silkworm gut twisted together can be attached to it. The loop is about 6 cm. wide. From the button outward for a distance of 2 to 3 cm. silk is wound around the loop, usually 30 turns, forming a shaft with the button at one end and the remainder of the loop at the other. The flexible loop is introduced into the uterine cavity, the shaft lies in the cervical canal and the button fits against the external os. It does not interfere with menstruation. It should be changed every 3 or 4 months.

Its action in preventing pregnancy is as follows: The glass button keeps the spermatozoa away from the alkaline mucus in the cervical canal for such a long time that most of them are killed by the acid vaginal secretion. The few that reach the cervical canal are devitalized by following around the 30 turns of silk on the shaft, or are caught in the loop of silkworm gut so that union with the ovum seems unlikely. If pregnancy takes place the loop can be drawn out without causing abortion.

He states that 23,000 of these pessaries have been used but only 2,000 in Germany!

FRANK A. PEMBERTON.

Winans: Some Indications for Therapeutic Abortion and Sterilization. Journal of the American Institute of Homoeopathy, 1921, xiv, 446.

The more important common conditions which are considered as indicating therapeutic abortion and sterilization are insanity, mental defectives, advanced tuberculosis, osteomalacia, eclampsia, cancer, and cases where cancer has recently been removed, chronic nephritis, and structural deformities. The method of sterilization advocated is a section of the tubes with burying of the uterine ends under a fold of the broad ligament.

W. K. FOSTER.

Emerick: Sterilization of the Mentally Unfit. Ohio State Medical Journal, 1921, xvii, 679.

An excellent resumé of the various laws and their workability is given. There are fifteen states in the union that have or have had some law of this kind. They are Connecticut, California, Indiana, Iowa, Kansas, Michigan, Nevada, Nebraska, New York, New Jersey, New Hampshire, North Dakota, South Dakota, Washington, and Wisconsin. The laws of California and Nebraska seem to be the best and the most enthusiastically supported. Letters from authorities at state institutions in most of the other states either disapprove of sterilization or state that the law has been repealed or declared unconstitutional. The author favors segregation because it is more economic, prevents the spread of venereal disease, and because sterilization does not reach the borderline case which is the most prolific.

W. K. FOSTER.

The American Journal of Obstetrics and Gynecology

VOL. VII

ST. LOUIS, MARCH, 1924

No. 3

Original Communications

A CHEMICAL STUDY OF THE INORGANIC CONSTITUENTS OF BLOOD IN NORMAL AND ABNORMAL PREGNANCY

BY W. DENIS, PH.D., AND E. L. KING, M.D., NEW ORLEANS, LA.

(From the Laboratory of Physiological Chemistry and the Department of Obstetrics of the School of Medicine, Tulane University)

DURING the past decade a number of chemical studies have been made of the blood of eclampsia patients and of normal pregnant women. Almost all of this work has been confined to investigations dealing with the distribution of the nonprotein nitrogen bodies, and to observations of the alkaline reserve and hydrogen-ion concentration. As this phase of the subject has been discussed in considerable detail in the recent publications of Killian and Sherwin¹ and of Caldwell and Lyle² we can refer to these papers both for excellent summaries of our present knowledge of the subject and for bibliographies of the same.

So far, although several authors have, on theoretical grounds, called attention to the possible significance of the subject, but little work has been done on the inorganic constituents of the blood either in normal or abnormal pregnancies; in fact the recent paper of Krebs and Briggs³ probably constitutes the only publication in which complete analyses of the inorganic constituents of the blood of pregnant women are given.

The figures presented in Tables I and II represent the result of a series of observations made during the summer and autumn of 1921 on the blood of patients in the obstetric service of the New Orleans Charity Hospital. Although our object was primarily to study the inorganic constituents of the blood in eclamptic cases, we found it

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

necessary, in view of the absence of available data to examine also a series of specimens taken from normal women in late pregnancy.

Our samples of blood were taken, as a rule, in the forenoon about three hours after breakfast, although a few were obtained in the afternoon several hours after the noon meal. Unless otherwise specified serum was used for all determinations.

The analytical technique employed was as follows: for sodium and potassium the methods of Kramer and Tisdall were used,⁴ calcium in a few of the earlier observations was determined by the method of Lyman⁵ and in all other samples by the technique recommended by Kramer and Howland,⁶ and magnesium by the procedure of Denis.⁷ For the acid radicals the following methods were employed; chlorides by the procedure of Smith,⁸ phosphates by the Bell-Doisy method,⁹ and sulphates by the procedure of Denis.¹⁰

In many cases observations were made on the alkaline reserve of the plasma as determined with the Van Slyke apparatus,¹¹ and for purposes of comparison we have also included observations on the nonprotein nitrogen and creatinine of the blood, both of which were determined by the procedure of Folin and Wu.¹²

In Table I we have collected the results obtained on the sera of eighteen normal pregnant women, all of whom were delivered within a few weeks after the blood sample was taken, and in Table II are presented the results of the examination of the blood and sera of twelve cases representing various types of toxemias.

TABLE I
INORGANIC CONSTITUENTS OF THE SERUM IN NORMAL AND PREGNANT WOMEN

CASE NO.	CO ₂ VOL %	MG. PER 100 C.C.								
		WHOLE BLOOD		SERUM						
		NON-PROTEIN NITROGEN	CREATININE	INORGANIC PO ₄ AS P	Cl	SO ₄ AS S	Na	K	Ca	Mg
3		25	1.3		354	0.5	325	19.5	11.0	2.3
4	49.5	20	1.4	4.5	345	0.6	332	19.0	10.8	2.2
6	41.0	21	1.2		327	0.5		19.0	10.0	2.5
7		30	1.4	3.1	355	0.4		19.0	10.1	2.5
8	42.0	21	1.3	3.0	340	0.6	355	19.0	9.0	2.6
10		23	1.1	3.3	349		320	22.0	9.2	2.4
11		25.5	1.2	3.0	332		340	19.2	9.5	2.3
13		25.0	1.0	3.3	345		330	21.5	9.7	2.7
15	56	21.5	1.3	3.0	342	0.6	336	19.0	9.4	3.0
16	60	30.0	1.3	3.1	366	0.4	347	19.4	10.4	2.6
17	53	30.0	1.5	3.0	340	0.3	343	21.0	9.1	2.6
19		39.0	1.1	3.6	345	0.4	344	18.4	11.0	2.4
20		35.0	1.2	2.9	340		318	19.5	11.0	2.3
21		27	1.3	3.0	310		362	19.4	10.0	2.5
23		32	1.2	3.0	316		320	20.0	10.0	2.6
26		32	1.3	2.8	336		310	20.0	9.4	2.7
27	58	30	1.1	3.3	345	0.5	335	22.0	9.4	2.6
28	51	30	1.1	2.9	340	0.5	315	23.0	9.6	2.5

Histories of the patients whose blood analyses are given in Table I.

- Case 3.—Blood taken 6/27/21, delivery 8/30/21. Age 17 years, pregnancies 1.
 Case 4.—Blood taken 7/1/21, delivery 8/30/21. Age 21 years, pregnancies 1.
 Case 6.—Blood taken 7/13/21, delivered 8/23/21. Age 31 years, 2nd pregnancy.
 Case 7.—Blood taken 7/14/21, delivered 7/20/21. Age 21 years, 2nd pregnancy.
 Case 8.—Blood taken 7/14/21, delivered 8/6/21. Age 28 years, 2nd pregnancy.
 Case 10.—Blood taken 7/14/21, delivered 7/25/21. Age 36 years, 7th pregnancy.
 Case 11.—Blood taken 7/14/21, delivered 7/24/21. Age 23 years, 1st pregnancy.
 Case 13.—Blood taken 7/20/21, delivered 7/24/21. Age 26 years, 2nd pregnancy.
 Case 15.—Blood taken 7/20/21. Left hospital before delivery.
 Case 16.—Blood taken 7/20/21, delivered 7/31/21. Age 34 years, 7th pregnancy.
 Case 17.—Blood taken 8/12/21, delivered 8/14/21. Age 31 years, 2nd pregnancy.
 Case 19.—Blood taken 8/12/21, delivered 8/21/21. Age 29 years, 5th pregnancy.
 Case 20.—Blood taken 8/12/21, delivered 8/18/21. Age 24 years, 1st pregnancy.
 Case 21.—Blood taken 8/12/21, delivered 8/14/21. Age 26 years, 2nd pregnancy.
 Case 25.—Blood taken 8/28/21, delivered 9/4/21. Age 27 years, 6th pregnancy.
 Case 26.—Blood taken 8/28/21, delivered 10/11/21. Age 24 years, 4th pregnancy.
 Case 27.—Blood taken 8/12/21, delivered 8/14/21. Age 31 years, 2nd pregnancy.
 Case 28.—Blood taken 8/12/21, delivered 8/21/21. Age 25 years, 3rd pregnancy.

TABLE II

INORGANIC CONSTITUENTS OF THE SERUM IN ECLAMPSIA AND PREECLAMPTIC TOXEMIA

CASE NO.	CO ₂ VOL %	MG. PER 100 C.C.									
		WHOLE BLOOD		SERUM							
		NON-PRO-TEIN NITRO-GEN	CREATININE	INOR-GANIC PO ₄ AS P	Cl	SO ₄ AS S	Na	K	Ca	Mg	DATE
5	24	25	2.8	3.4	385	0.5	343	19.6	9.5	2.61	7/ 9/21
24	41.2	33	1.7	3.5	360	0.5	349	23.0	9.6	2.60	8/18/21
24		28	1.2	3.4	340	0.5	350	20.0	10.5	2.54	8/26/21
24	52.0	25	1.2	3.8	375	0.6	346	22.0	9.6	2.3	8/30/21
30		32	1.3	4.1	330	0.5	375		9.5	2.5	8/26/21
39	32	24	1.2	2.0	381		322	19.0	9.0	2.44	10/23/21
39	24	39	1.2	2.0	378		330	20.0	10.0	2.39	11/ 3/21
42	60	33	1.3	2.1	375	0.48	370	21.2	10.2	2.50	11/ 9/21
42	59	39	1.1	3.2	378	0.50	330	23.0	9.0	2.55	11/29/21
43		100	1.5		366	3.2	325	22.0	10.1	2.6	12/16/21
45		30	1.1	3.0	372		330	21.9	9.6	2.6	11/29/21
46	39	60	2.1	2.2	374		336	23.0	9.8	2.5	11/29/21
56	38	62	2.0	3.2	340	0.5		22.1	10.0		2/ 9/22
49		75	1.3	2.5	384	0.91	310	20.2	10.2	2.39	2/16/21
53		32	1.2						9.9		2/ 2/22
54		28	1.1	2.4	335	0.5	292	22.0	10.1	2.55	2/ 2/22

Histories of the patients whose blood analyses are given in Table II.

Case 5.—A multipara, had been under treatment for about one month for hypertension and albuminuria. Entered hospital in coma and died, after several convulsions, 12 hours after admission. Blood sample was taken while in coma.

Case 24.—A primipara, admitted in labor, had 3 convulsions 9 to 10 hours after delivery. Recorded and left hospital with urine still showing albumin and casts.

Case 30.—A multipara, under observation for 4 to 5 months on account of slight edema, hypertension and albuminuria. Normal delivery, no convulsions.

Case 39.—A primipara, age twenty-one years, at term, edema for one week with some toxic symptoms, labor induced, baby stillborn; 1 convulsion 18 hours after delivery. Recovery with albuminuria persisting until discharge.

Case 42.—Multipara, under observation for hypertension and albuminuria. Labor induced, recovery.

Case 43.—Multipara, 7 months pregnant, admitted in coma, four convulsions before and one convulsion after the delivery of a stillborn child.

Case 45.—Multipara, hypertension and some toxic symptoms albuminuria, normal delivery of a living child.

Case 56.—Primipara, 10 convulsions, baby stillborn. Mother died shortly after delivery.

Case 49.—Multipara, patient admitted in coma, had several convulsions, induced labor caused birth of macerated child. After delivery convulsions continued followed by coma and death.

Case 53.—Primipara, general edema, albuminuria but with no toxic symptoms, normal delivery of living child.

Case 54.—Multipara, edema, albuminuria, vomiting and headache. Induced labor caused delivery of stillborn child.

In considering the results presented in Tables I and II it is first desirable to decide on what may be considered the normal concentration of the inorganic constituents of human blood. A summary of the literature on this subject has recently been published by Denis and Hobson¹³ and a repetition is, therefore, unnecessary in this paper. On the whole, as far as can be determined by the data now available, the following figures may be taken to represent average values for the inorganic constituents of normal adult serum expressed as milligrams per 100 c.c.

Na	K	Ca	Mg	Cl	PO ₄ AS P	SO ₄ AS S
339	20.5	10	2.4	360	3.	0.5

An examination of the results on both the normal and abnormal cases indicates, on the whole, the same remarkable constancy of the concentration of the inorganic constituents as has been previously shown to exist for normal subjects.

In Table II a distinct increase is noted in the sulphate content of the sera of Cases 43 and 49, an increase which is coincident with a retention of nitrogenous bodies as shown by the high values obtained for the nonprotein nitrogen fraction, and which is analogous to the retention of sulphates observed by Denis and Hobson¹³ to occur in certain cases of nephritis.

The suggestion has frequently been made that in pregnancy, particularly in the later months of this condition there often, or according to some authors invariably, occurs marked abnormalities in calcium metabolism. Within the past few years, since the perfection of reliable micro methods for the determination of blood calcium, several investigations have been made to determine whether, as has frequently

been stated by the older writers on the subject, there is to be found in this condition a lowering of the level of the calcium content of the blood.

On the whole, the results so far published may be considered to give somewhat contradictory results. Kehrer¹⁴ finds that the calcium content of whole blood falls during the latter half of pregnancy; De Wesselow¹⁵ reports that serum calcium is frequently, but not invariably, low during the later months of pregnancy, and essentially the same conclusion is reached by Krebs and Briggs,³ and by Bogert and Plass.¹⁶ Widdows¹⁷ finds that in most (but not all) cases there is a tendency to a decrease in the calcium content in the blood in late pregnancy and a general tendency to rise directly after confinement, but reaches this conclusion by analyses of the blood of the same individuals at definite periods during pregnancy, as her results indicate that a wide range of values may be obtained from different cases taken at any specified month.

TABLE III
CALCIUM IN THE SERUM OF NORMAL PREGNANT WOMEN

CASE NO.	AGE YEARS	GRAVIDA	GESTATION MONTH	CA-MG. PER 100 C.C. SERUM	CASE NO.	AGE YEARS	GRAVIDA	GESTATION MONTH	CA-MG. PER 100 C.C. SERUM
36	20	II	2.0	11.2	55	22	I	7.5	11.0
49	18	I	2.0	10.6	46	16	I	7.5	11.4
62	18	I	2.0	10.2	33	17	I	7.5	10.8
42	22	II	3.0	11.4	11	19	I	8.0	11.2
40	31	IV	4.0	11.0	12	37	VIII	8.0	11.6
63	18	I	4.0	10.4	13	17	I	8.0	11.2
1	25	I	4.0	11.9	16	24	I	8.0	11.2
3	21	I	4.0	11.7	22	30	VI	8.0	10.6
5	17	I	4.0	10.6	25	20	I	8.0	11.2
23	30	III	5.0	11.0	27	21	IV	8.0	11.6
26	18	I	5.0	11.2	28	18	I	8.0	10.8
2	27	III	6.0	11.1	32	25	V	8.0	10.6
4	24	II	6.0	11.0	38	21	I	8.0	10.6
7	25	VI	6.0	11.4	39	18	I	8.0	10.8
9	22	III	6.0	11.6	43	15	I	8.0	10.6
51	19	II	6.0	10.2	45	24	III	8.0	11.2
60	18	II	6.0	10.2	52	21	II	8.0	10.4
29	22	I	6.0	11.0	54	21	II	8.0	11.0
6	18	I	7.0	10.6	58	22	II	8.0	10.6
16	19	I	7.0	11.2	59	20	I	8.0	10.4
17	22	I	7.0	10.8	64	31	VIII	8.0	10.6
19	17	I	7.0	11.2	47	18	I	8.5	11.7
20	37	IX	7.0	10.4	8	37	VI	9.0	11.2
24	23	I	7.0	10.8	14	21	I	9.0	10.8
31	38	II	7.0	10.4	15	22	II	9.0	11.6
35	18	I	7.0	10.2	18	23	IV	9.0	11.2
41	17	I	7.0	10.4	21	18	II	9.0	10.6
49	23	IV	7.0	10.8	30	23	III	9.0	10.8
48	20	II	7.0	10.4	34	25	II	9.0	10.4
53	35	VIII	7.0	10.4	37	21	I	9.0	10.8
56	19	I	7.0	10.8	50	27	III	9.0	11.2
61	19	I	7.0	10.4	57	17	I	9.0	10.6

On the other hand Jansen¹⁸ finds the calcium content of the blood little altered by pregnancy, whereas Lamars¹⁹ believes that the calcium content of the blood of pregnant women is higher than in the non-pregnant, and Meigs, Blatherwick and Cary²⁰ found no significant lowering of the calcium in the whole blood or serum of pregnant cows.

In Table III are presented the results of the examination of the sera of 64 women in practically all stages of pregnancy, all of whom may be classed as strictly normal subjects.

If we accept the values of 9 to 11 milligrams per 100 c.c. as representing the standards for normal serum calcium, a study of the results presented in Tables I and III leads to an agreement with the conclusions of those earlier investigators, who believe that no significant changes occur in the serum calcium of pregnant women, or at least no change which can be demonstrated by the methods of attack used here; whether it would have been possible to have demonstrated a progressive lowering of the serum calcium in individual cases, had we been able to obtain specimens of blood from the same subjects at different times during pregnancy, as was done in the investigations of Widdows, can only be shown by further work on the subject.

Our results on serum calcium in cases of toxemia as given in Table II are interesting in view of the various speculations which have been published regarding the supposed relation of a lowered blood calcium and the convulsions of eclampsia, for while in a number of these cases convulsions occurred, in no instance was it possible to demonstrate any lowering of the calcium content of the serum or any abnormal ratio in the concentration of the various inorganic constituents of this fluid.

REFERENCES

- (1) Killian, J. A. and Sherwin, C. P.: AM. JOUR. OBST. AND GYNEC., 1921, ii, 2.
- (2) Caldwell, W. E. and Lyle, W. G.: AM. JOUR. OBST. AND GYNEC., 1921, ii, 3.
- (3) Krebs, O. S. and Briggs, A. P.: AM. JOUR. OBST. AND GYNEC., 1923, v, 3.
- (4) Kramer, B. and Tisdall, F. F.: Jour. Biol. Chem., 1921, xlii, 339, 467.
- (5) Lyman, H.: Jour. Biol. Chem., 1917, xxix, 169.
- (6) Kramer, B. and Howland, J.: Jour. Biol. Chem., 1920, xliii, 35.
- (7) Denis, W.: Jour. Biol. Chem., 1922, lii, 411.
- (8) Smith, M.: Jour. Biol. Chem., 1920-21, xlv, 437.
- (9) Bell, R. D. and Dotsy, E. A.: Jour. Biol. Chem., 1920, xlii, 55.
- (10) Denis, W.: Jour. Biol. Chem., 1921, xlix, 311.
- (11) Van Slyke, D. D.: Jour. Biol. Chem., 1917, xxx, 347.
- (12) Folin, O. and Wu, H.: Jour. Biol. Chem., 1919, xxxviii, 81.
- (13) Denis, W. and Hobson, S.: Jour. Biol. Chem., 1923, lv, 183.
- (14) Kehler, E.: Arch. Gynäk., 1920, cxii, 487.
- (15) De Wesselow, O. L. V.: Lancet, 1922, ii, 227.
- (16) Bogert, L. J. and Plass, E. D.: Jour. Biol. Chem., 1923, lvi, 297.
- (17) Widdows, S. T.: Jour. Biol. Chem., 1923, xvii, 34.
- (18) Jansen, W. H.: Deutsch. Arch. f. klin. Med., 1918, 125.
- (19) Lamars, W. Z.: Monatschr. f. Geburtsh. u. Gynäk., 1923, lxxi, 393.
- (20) Meigs, E. B., Blatherwick, N. R. and Cary, C. A.: Jour. Biol. Chem., 1919, xxxvii, 1.

THE COLLEGE—THE HOSPITAL—THE MEDICAL STUDENT*

By G. K. DICKINSON, M.D., F.A.C.S., JERSEY CITY, N. J.

HE is honored of men who, by his peers, is raised to a place of prominence. To be selected by the Fellows of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons as their president carries the greatest honor that can come to any one in our profession, and humbly do I fill the position thus given me.

But all honors involve an obligation. To be president of this organization means much more than a chairmanship. It means going down into the cockles of the heart, where the blood is warm, and searching for some truth, for some idealism to present, hoping it may stimulate in the minds of those who listen an activity which will bear fruit.

"I have gone many ways in the wanderings of thought," and feel that nothing is more pleasing or more important than some thoughts on "The Lad." The making of a medical mind will be swerved according to mentality, which is largely ordained by the Fates, for the blood of ancestry fixes character. When the young man launches towards his life work he lacks experience; that comes many years later. He is directed by unconscious motives. Associations and friendships give him some inkling of the germ that is within him, and, without logic, without concrete thought, he endeavors to make a proper decision.

Having an imperfect vision of the future, obsessed largely by his schooling, confident in himself, affected by the urge of his endocrines, youth goes ahead, trusting that those whom he may meet in the schools of training will be honest, fair and helpful, little realizing how much the personal equation of the professor, the bias of the times and the shortsighted laws of governing bodies may affect his entire life.

The intellectual type will find no person for his stimulation and special growth. Genius has no friends. Capable persons are never liked. The mediocre will be allowed to plod, guided at times and hindered at others. Perhaps this picture can be best visualized by some personalities.

It seems now as if the college we attended was instituted not so much for training the young man to be a doctor, as to add to the income of the professors and give them prestige in the community. A red ticket was purchased for a certain privilege, anatomy, and

*President's address presented at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

we were taught and did dissections without a viewpoint of practical application. We knew Gray and the cadaver, but not the reason.

Surgery was an exhibition of skill and rapidity, not of diagnosis and careful thought. We were expected to applaud and yet not get the touch. Pathology was almost unknown, but morbid anatomy was passed around on a platter to be fingered, and the contaminated finger put into the pocket where previous contaminations had gone.

Gynecology was the mucous plug of the cervix and the stick of nitrate of silver. Obstetrics was taught by absent treatment, for we never saw a child born. And so through the gamut we would sit on benches and hear talks, see little, and have examinations. It was possible, in a year, for the greenest man to obtain a degree, and when we consider that the boy whose father found a failure in life, could be thrust into medicine and made a doctor, one can comprehend the type of physician of the day.

Further proof is that after leaving college we joined our medical societies where little that was scientific or clinical was brought up, but where most of the time was spent in dissensions and idle talks.

But in all this there was a ray of light. Two things, both important in professional contact, were not suppressed in the human nature of the young man, for the mysteries and faith had not been stunted nor killed—faith in drugs as we nowadays have faith in aids, forgetting as Paré said, "The physician treats, but God cures."

This chaotic and almost criminal method of making doctors after the gristmill fashion of grinding up anything that comes along and calling it success, could not continue indefinitely, and in 1910 the voice of Jeremiah was heard, when Flexner issued his report—a scathing denunciation, yet truthful statement, of educational conditions in the United States and Canada. He found nearly two hundred colleges, very few of them giving an education leading up to proper thought and meditation, or one providing mental food to nourish and stimulate the higher centers. In the great majority the student was being rushed through and tinselled as he was in our time.

The young with good preliminary training, an inherited poise and love for the truth and an irresistible desire to investigate for himself and to know rather than to accept, would come out of any institution a credit. The history of the past in the profession is the history of just such men only. The old story of Mark Hopkins on one end of the log and the student on the other has been proved many times.

Youth is imperious and positive; sees his own way, not comprehending that of others; unconsciously he fits in with a symbol. We perceive four main types as illustrated in his ambition. Aurelius said,

“The value of a man is the value of the objects on which his heart is set.”

Mayhap he desires a general field, to go to the bedside and home, there to practice the art and make a humble living. In this he is following the footsteps of Pythagoras, the earliest family physician.

Others with a conceit of their worth, without thought of their limitations, foresee their placement in hospital work. “They are going to be surgeons.” They are restless of the older men who have earned the right. They do not comprehend the importance of large experience, and from the start would be Aesculapians.

A few, with warmer hearts and sympathy towards mankind, not thinking of gold, but more of social service and actuated by the spirit of brotherhood, take Saint Luke as their model.

Still fewer, minds of high mentality, men who follow the precepts of John Hunter, “do not think, but try.” Those who are our students and research workers, imbued with high idealism, yet often poor in script, the ones whose names resound through the ages, are inspired by the heights of Apollo.

To some these remarks may seem irrelevant and fanciful, but by us the *guiding spirit of the young man* should be kept ever in mind and symbolized. “The true physician is one having the human body as a subject, not a mere money-maker.”

These four types of mentality have been the grist of the college mill in the past and will be in the future. Flexner so pictured conditions that the general profession as well as the collegians were compelled to bring about a readjustment. The usual thing happened. The colleges which were honest in their motives, rapidly came into line. Those that were administered by men of commercial tendencies did much wobbling, but now we have the majority of colleges, taking the young men, crude, with diverse mentalities and ambitions, but with a stated preliminary education, using a popular term, and endeavoring to make doctors of them.

But several matters have developed in the interim and a number of viewpoints have been exploited. Never has there been so much public interest taken in education as at present, evidenced by numerous articles appearing in the different journals and lay press, and the papers read in our society meetings. It is very apparent that the present methods are not satisfactory. Yet we are accepting the product termed an *education* as a criterion, neglecting intelligence and cleverness of mind. Where are our applied psychologists?

It seems impossible to take the mind from the material. When Moses went up into the Mount for inspiration, he came back to find the people worshiping the golden calf. Every time we make an advance toward our ideals we discover only too large a number striv-

ing for the gold. This is an age of business and business principles. Largely unconscious to those now living, the trend is to develop the business aspects of the professions. The nursing profession is an evidence of this, as well as our own.

Flexner reduced the number of colleges, raised their "standards," diminished the number of students, but made it more difficult for the poor man's son with intelligence and love for the calling to enter and become a physician. The internes tell us that medicine is the most expensive profession to enter. Hospitals that not so many years ago obtained internes without offering them a bonus, now are compelled to give a fairly substantial one. Many of the lads before they finish internship have invested their parents' last penny in their education, and are obliged to obtain a salaried position before starting out in general practice and become self-supporting.

As a consequence, the prophecy made a dozen years ago seems to be coming true, that though we have fewer and better colleges and the minds of the young man more broadly learned, there is an empty space in life which is being filled by the pathies, being an evidence of how we fall to magic and the mysteries.

It seems to be forgotten that "a physician is one who satisfies the longings and yearnings of the body and soul, as well as one who understands disease and its treatment." Are we nowadays making physicians? Is not Plato correct, and should we not ever keep in mind his noble definition?

Much in medicine tends to negative education, for instance, the x-ray. Nothing catches the ordinary mind so firmly as that which appeals to the eye, for the average man dislikes to think and is soon fatigued by thinking. Has it not become a habit for the public to ask for an x-ray? Has it not become the path of least resistance for the physician to request them and accept the opinion as given of the shadow for a diagnosis? A recent work makes the statement that "without the aid of the x-ray, diagnosis is not possible for the careless, inexperienced and incompetent," and, again, "the laboratory is the scientific gold brick."

Not for a moment do we deery the immense value of the x-rays and laboratory helps, but what we must develop in the young student is judgment and sense of proportion, and that can be done only at the bedside. The true physician should have the intelligence and conscience to get away from this ennumbrance.

Franklin Martin conceived a great thought in his endeavor to raise the status of the hospital. He gives his life, time and the best that is in him for this purpose. The movement was so needed and his work so thorough, that many hospitals have been greatly benefited. The lack of knowledge of what a hospital should be has been followed by

a better understanding, because at every meeting he is telling the story over and over again. It may be tiresome to the profession, but it is valuable to the public. But hospitals are as human beings; the innovation does not last. Idealism is tiring and hospitals begin to slide back. The patient is studied less and the laboratory more.

Medicine has grown so rapidly that unconsciously it became necessary to develop many specialties. No one man has the brain or the length of life to cover all the branches with their rapid accumulation of data, but the more specialties grew, the more evident was it that each interlocked. Biologically or physiologically speaking there are no specialties. The body acts as a unit, connection by both spinal and sympathetic nerves, and general interaction through the endocrines leads to a harmony of body action.

The obstetrician, the gynecologist, or the surgeon, to be successful in his care must be a good diagnostician and therapist of every organ in the body. He must know pathology and physiology in the broad sense. No matter what our specialties are we cannot escape the responsibility of broad general knowledge. To specialize narrows the mental horizon and limits meditation, so that except for technic, whether it be pill, powder or lancet, we should know all things.

What are our colleges doing today? In my opinion they are making one great mistake. They are putting the law on the young man. They are dictating what instruction he shall have before he will be accepted as a student in medicine. A lad with money may manage to go through college and the requisite number of years of hospital training, but the bright man with intelligence may be barred because his parents could not afford the game.

The stars that shine the brightest in the history of the past were the poor men, the self-made. We could name many who have made medicine what it is, but whom the law today would not allow to study. It is said that if the Lord came back to earth He could not find a church which would accept Him. This regulation seemingly cuts out the most desirable.

Another misfortune is the long deferred entrance into active practice. So much time is spent as a student in the colleges and in hospitals that a young man cannot become self-supporting until into the thirties. This is the time of life when his brain and body are most active and pliable. It is now that he shows his individuality. Big thoughts and high ambitions stir his soul. It is at this period that the body yearns for matrimony and home life. To be handicapped by long suppression of normal instincts but subverts the future.

The spirit of America is opening the door in a most democratic way to the clever, which means, to those who have minds and are willing to use them. Intelligence and determination are the criteria.

Aristocracy worships capital and that which is its corollary, social position, but progress comes through the man who in his shirt sleeves reaches up from the bottom, who has to strive to succeed and through striving trains his mind. To suppress efficient mentality by putting a tax on the beginner will eventually not only obscure many a shining light, but weaken the profession as a whole.

It seems as if some of the specialties might be postponed to a post-graduate period. Valuable as general knowledge may be, it cannot be acquired in the ordinary time devoted to college instruction. Then much of it is too material. Give one a start on a few things and he will do the rest by the bedside and in his study. Should we not substitute for some a lucid stimulating course on the lives of leading minds and those who have made medicine what it is, associated with the philosophy of medicine and applied ethics? Nothing makes for culture more than the knowledge of our forebears, their times, what they did, how they succeeded, and the difficulties besetting their paths.

Naturally, each thinker feels his branch is the most important. Four years of study, and during these four years is anything made of the humanities? Are we trying to make doctors or mechanicians? Are we trying to make healers of the soul and body, or are we simply giving instruction?

We find from the many internes we have met and talked with that that which their professors have told them is final. Any different opinion is heresy. These men have not been taught to think. They have not been made to understand that truth is but a fragment, that during their whole life they must be searching for it, and will only find it piece by piece. They are sowing weeds as well as fruitful seeds, and when college is finished and practice begun, they will discover that they must forget much they were taught and learn medicine all over again at the bedside. This is what we call "weeding the garden," for, as Sydenham says, "True practice consists in observations of Nature."

Ten or more years ago I wrote to the deans of the New York colleges, asking for a conference in order that a notion of mine might be discussed. Dean Brown replied, and, after a delightful dinner, over our cigars I talked with him of the plan that no man leaving college should obtain his diploma until he had served a specified time in some hospital, that the college should select among the hospitals of the community those with which it can work, and stated the proposition thus:

"We will provide you with internes, you need not worry about this matter in the future. Two score cards will be sent out, one for the hospital authorities and one for the interne. The hospital author-

ities shall report whether the interne proves acceptable on different points—industry, kindness, promptness, carefulness in making histories and physical examinations, presenting a proper personal appearance, etc. The interne shall report whether the doctors individually are giving proper instruction and whether the medical, surgical, or other departments are teaching him as they should. He is to report defects in his bedside instruction. He is there as a student, not as a servant or high-class orderly. If the dean of the college finds that the instruction is poor, word will go to the board of managers, that Dr. So-and-So is falling behind in fulfilling an obligation. If this incompetence continues, the hospital's attention will be called to the neglect, and perhaps that particular attendant may be asked to resign. If, on the other hand, complaints are made of the lad, he will be 'jogged' up. Should he fail to improve, he will be removed and receive no diploma."

In this way, instruction at the bedside will be obtained for the student interne. He will learn medicine, he will learn the personal touch, he will learn that each patient has a soul, home-ties and friends, as well as an illness, and he will be made a teacher of men.

The hospitals will be elevated, even more materially than by Franklin Martin's method. This will be a slow process. There are too few hospitals that have a teaching staff, but if the plan be started and broadly utilized, it will not be many years before we will have better hospitals, better professors, and will be making doctors of "high-erected thoughts situated in a heart of courtesy."

280 MONTGOMERY STREET.

SUMMARY OF THE ANSWERS TO THE QUESTIONNAIRE SUBMITTED TO THE MEMBERS OF THE NEW YORK OBSTETRICAL SOCIETY ON THE "REGULA- TION OF CONCEPTION"*

LAST year the council of the New York Obstetrical Society determined to include the birth control problem as a part of the program on the evening devoted to questions of sociologic interest. A paper was presented on the subject by Dr. Geo. W. Kosmak in March, 1923, and as a result of the discussion a committee was appointed to canvass the members as to their attitude in regard to the regulation of conception. This committee went over the subject carefully and adopted a series of twenty-two questions calculated to ascertain the attitude of the individual members. Fifty-seven answered the questionnaire and a majority signed their replies. Many failed to answer every question and therefore there could be found no common basis for percentage figures.

The questions and a summary of the answers follow:

- Q. I: In response to the general desire for an expression of opinion by authoritative medical organizations on the subject popularly known as "birth control", do you approve of a scientific study of this topic sponsored by this Society?
- A. I: Yes, 29; no, 15; not ans., 13; total, 57.
- Q. II: Or, should this Society itself undertake such study?
- A. II: Yes, 28; no, 15; not ans., 14; total, 57.
- Q. III: If you thus approve, please check in the following list the topics that you believe should be properly considered.
- (a) The necessity for controlling the size of the individual family for purely economic or personal reasons.
 - (b) The excess of childbearing on the physical or mental state of the mother.
 - (c) The control of excessive individual fertility without the presence of organic disease.
 - (d) Constitutional or incurable disease in the mother.
- A. III: a. 25; b. 45; c. 26; d. 48; not ans., 7.
- Q. IV: In case the New York Obstetrical Society or the other societies find no volunteers and no funds, do you think it advisable that a new organization which has funds and volunteers should undertake to study fertility, sterility and contraception—always provided that there be complete medical control of such organizations, that proper case records be filed and studied, and follow-up of patients undertaken?
- A. IV: Yes, 34; no, 14; ind. opinions, 2; not ans., 7; total, 57.

*Presented at a meeting of the New York Obstetrical Society, November 13, 1923, by a special committee previously appointed, consisting of Drs. Harold Bailey (Chairman), R. L. Dickinson, F. C. Holden, G. W. Kosmak, and W. E. Studdiford.

- Q. V: Do you believe that the existing institutions for the treatment of certain groups of constitutional diseases such as insane asylums, tuberculosis sanatoria, etc., and likewise general hospitals, solve their problems in this field by providing themselves with a consulting staff of gynecologists and obstetricians for the carrying out of whatever procedure may be considered necessary, including sterilization or the giving of contraceptive advice, or should such patients be referred for advice and treatment to obstetric and gynecologic institutions?
- A. V: Referred to obstetric and gynecologic institutions, 28; existing institutions, 21; individual opinions, 3; not answered, 5; total, 57.
- Q. VI: Do you advise private patients regarding the regulation of conception?
- A. VI: Yes, 35; no, 4; occasionally, 15; not ans., 3; total, 57.
- Q. VII: If you do not so advise patients, is it for reasons connected with religious beliefs that you object to furnishing information on contraception?
- A. VII: No, 15; not ans., 42; total, 57.
- Q. VIII: What indications do you personally accept for advising contraceptive measures?
- A. VIII: Medical and physical, 47; economic and social, 14; individual opinions, 3; not answered, 5.
- Q. IX: What contraceptive methods do you advise or approve?
- A. IX: Condom, 38; douche, 18; suppositories, 10; not ans., 10; (various other methods one or two votes).
- Q. X: Have you any actual knowledge or experience of methods that are uniformly successful?
- A. X: Condom, 5; douche, 2; other methods, 3; no, 41; not ans., 6; total 57.
- Q. XI: What contraceptive measures do you consider harmful in a physical or mental sense?
- A. XI: Withdrawal, 33; pessaries, and stems, 32; douche, 7; all, 5; not ans., 9.
- Q. XII: Have you seen any evidence or clear-cut pathology attributable to some particular device or procedure?
- A. XII: Yes, 38; no, 12; not ans., 7; total, 57.
- Q. XIII: Have you any particular data on the subject that you can contribute provided the committee decides to collect clinical material?
- A. XIII: Yes, 9; no, 38; ind. opin., 4; not ans., 6; total, 57.
- Q. XIV: Do you give instructions immediately preceding marriage?
- A. XIV: Yes, 14; no, 19; occasionally, 17; not ans., 7; total, 57.
- Q. XV: At such times do you take steps actively to counsel childbearing?
- A. XV: Yes, 26; no, 16; occasionally, 5; not ans., 10; total, 57.
- Q. XVI: Do you give such advice verbally or in writing?
- A. XVI: Verbally, 41; writing, 0; not ans., 16; total, 57.
- Q. XVII: Do you participate in the conduct of a prenatal, obstetric, or gynecologic dispensary or clinic in which contraceptive advice is given to patients?
- A. XVII: Yes, 6; no, 45; not ans., 6; total, 57.
- Q. XVIII: Do you believe that special clinics should be established devoted to this purpose and manned by physicians and nurses?
- A. XVIII: Yes, 10; no, 34; ind. opinions, 8; not ans., 5; total, 57.

- Q. XIX: Should nursing organizations as such be utilized for teaching the use of contraceptives?
- A. XIX: Yes, 1; no, 47; doubtful, 4; not ans., 5; total, 57.
- Q. XX: Should information concerning contraceptives be made generally accessible to the public?
- A. XX: Yes, 4; no, 42; ind. opinions, 7; not ans., 4; total, 57.
- Q. XXI: Do you believe that sterilization rather than the giving of contraceptive advice should be undertaken in the presence of constitutional or incurable diseases, including nephritis, endocarditis, tuberculosis, insanity, bodily deformity, or other conditions which would be rendered dangerous to life by the advent of pregnancy?
- A. XXI: Yes, 27; no, 7; yes with reservation, 20; not answered, 3; total, 57.
- Q. XXII: What suggestions have you for sterilizing women declared to be incapable of childbearing without undue hazard? Mention whether by laparotomy with tubal ligation or resection; by a series of x-ray exposures; by radium applied externally or within the uterus; or by cauterizing sound to stricture the uterine ostia of the tubes?
- A. XXII: Tubal resection and inversion, 39; x-ray, 10; radium, 7; cauterizing, 2; not ans., 5.

In general the summary shows that 69 per cent of the 42 who voted were in favor of a scientific study of contraception, sponsored by the Society, and to be undertaken by it; but if funds and volunteers are not available to the Society, about the same number endorse an investigation conducted by an organization under complete medical control.

Excessive childbearing as affecting health and the diseases wherein pregnancy endangers life, are the topics generally favored for study. Economic reasons and individual excessive fertility as subjects for consideration were sanctioned by 50 per cent of the members who answered. The majority oppose special clinics for contraception instruction and there is substantial agreement condemning teaching by nursing organizations as such, or release of information to the general public. In the matter of institutions for incurables, reference to gynecologic and obstetric hospitals is favored rather than advice and treatment by consultants on the staff.

Eighty per cent of the 51 members who answered the questions had no knowledge of a uniformly effective contraceptive and about the same percentage advised and approved of the use of the condom. The douche and the suppository get some recommendation. Withdrawal comes in for rather general condemnation, as do stems and pessaries. Four-fifths of the reporters have seen harm from some device or procedure and a few have clinical reports to be drawn upon, but no reply based on a digest of case reports is given.

The majority give verbal, but never written, instructions in contraception. The indications recognized are physical and medical in all but 10 per cent of the responses, but 24 per cent included eco-

nomie reasons. Over half instruct before marriage, but most of these only occasionally.

Three-fourths are in favor of sterilization in the presence of conditions where pregnancy endangers life. Abdominal operation with tubal closure is the favorite method. A few vote for radium or x-ray and two mention the cautery sound.

(For discussion, see p. 339.)

DIVERTICULA AND DIVERTICULITIS*

BY JEROME M. LYNCH, M.D., NEW YORK CITY, N. Y.

DIVERTICULITIS and diverticulosis have been frequently mentioned in medical literature for the last sixty years, but little attention was paid to this condition until Graser's paper appeared.

Sir Charles Ball, in the early eighties, described several cases that had come under his observation or had been seen by his associates. A remarkably good drawing is shown in his book of a specimen he removed at autopsy. He tells us that while pathology is not infrequent, he felt there was no reason why a diverticulum which became inflamed should not have the same pathology as appendicitis; and, in substantiation, relates a case brought to one of his colleagues, in which an inflamed diverticulum became attached to the bladder, resulting in a fistula.

Practically nothing has since been written that goes any further than Ball, though one must appreciate the lucid and instructive paper of Telling, and the learned contribution of Edwin Beer.

And while almost every paper published on this subject considers the cause, I do not find any additional light since Telling's paper appeared.

Diverticuli have always been divided into the true and the false. The true diverticuli, accepted as of congenital origin, contains all the coats of the bowel and usually occur in certain areas where diverticulation is physiologic; that is, in the region of the fundus of the stomach, the duodenum and the cecum. As you know, the fundus of the stomach is developed as an outgrowth from the dorsal border, its origin being somewhat similar to that of the cecum. In the region of the duodenum there is an outbudding to form the pancreas and the liver. About the last of the first month of fetal life a diverticulum appears on the posterior limb of the U-shaped tube, which later goes to form the cecum and appendix.

Later on, the cecum, when it becomes differentiated from the appendix, is developed by diverticulation. Another diverticulum which frequently remains to give trouble is that which is known as "Meckel's," which is the remnant of the neck of the yolk sac. This occurs in, about

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

2 per cent of cases; but the importance of diverticula of the colon is confined to that variety which is supposed to be acquired.

The factors that are supposedly the cause of diverticulation are, so far as they have appeared in the literature, increased pressure within the bowel, weakening of the muscular tone of the bowel wall as a whole, in fact any factor which brings about weak spots in the bowel through which a herniation of the mucosa might occur; also excessive fat.

All seem to agree that increased pressure within the bowel is the most potent contributing cause of diverticulosis. Without due deliberation, this would seem to be a natural inference; but, on more critical study one is not inclined to take this for granted. It seems unique that gaseous distention of the bowel should be segmental and especially pronounced in the region of the sigmoid. My own experience is that gaseousness is more pronounced in the cecocolon than in the sigmoid.

It has been shown that when the bowel ruptures under pressure, it is always in the long axis; it would therefore seem that if the pressure was sufficient to cause herniation of the mucosa we might expect rupture instead of herniation.

Since diverticulosis occurs more frequently in people over forty, writers seem to infer that the weakening of the muscular tone, a frequent accompaniment of old age, must necessarily be a potent factor in the formation of diverticuli.

There are many cases in the literature of diverticulosis in children, and while this is not proof of congenital origin of diverticulosis, it is significant. We have all seen cases of megacolon where the conditions are such as have been assigned as causative factors in diverticulosis; but in no instance, to my knowledge, has diverticulosis been found associated with megacolon.

The influence of obesity by bringing about a general weakening of the musculature and providing a series of spots of lowered resistance to pressure from within, especially opposite the appendices epiploicae, allows the mucous membrane to herniate through these weak spots. Bland-Sutton has pointed out that the submucous fat is continuous with that of the appendices epiploicae and so exerts a directly predisposing effect on these hernial out-pushings. In addition to this, Telling has suggested that where the blood vessels penetrate there is a relative weakness of the muscular wall, and that as the blood vessels are constantly subject to change in calibre, herniation might occur at this point. He does not mention, what seems to me, the most important fact, that wherever a blood vessel penetrates muscular tissue it is surrounded by a connective tissue tunnel. We all know that there is a great variation in the quality of connective tissue in individuals, and that as connective tissue holds all the muscular bundles together and influences the tone of muscle we might infer that diverticulosis is the

result of a poor quality of connective tissue, which by easily giving way under pressure might permit herniation of the mucosa.

This, however, offers a fertile field for investigation. Lewis has pointed out that extension of the intestinal glands of Lieberkuhn through the muscularis mucosa in relation with lymph nodules, is a common occurrence during fetal life. The distal diverticuli with the fork-shaped glands are primary submucous glands, which become surrounded by lymphoid tissue, and he believes that it is quite possible that these structures may give rise to pathology as the result of diverticulation. In support of this is the fact that in many instances diverticuli have been found in a number of young children and this should offer some support to the congenital theory of diverticulitis.

I do not wish it understood that I believe that I have proved or disproved anything. I do feel, however, that there is almost as much support on one side as the other, and I hope by offering some proof of the congenital origin of diverticuli I may stimulate investigation as to the cause of this very interesting condition. In my opinion, causes so far assigned to diverticulosis should be accepted with some reserve. Is it not much more reasonable to suppose that the glands of Lieberkuhn have so deeply penetrated the bowel beyond the usual depth that they form pockets, which, under pressure, plus a poor quality of connective tissue, may give rise to herniation of the mucous membrane and form diverticuli? Taking for granted the presence of diverticuli, one can readily see the possibilities of a secondary pathology. This may be brought about by bacteria passing through a very thin membrane. Here we have leading from the inside of the bowel narrow necks ending in dilated, flask-like pouches outside of the intestine. The outside or dilated portion is formed of mucous membrane and peritoneum.

At first the sac may be so thin as to permit the bacteria to filter through, resulting in a local peritonitis without perforation, or as happens in appendicitis, the sac may rupture, giving rise to a local abscess or a general peritonitis.

Owing to a low grade inflammation with ulceration, we may have a proliferation rather than a destruction of tissue, resulting in a tumor formation somewhat similar to that seen in hyperplastic tuberculosis and ending in a stenosis of the bowel. This is not an infrequent occurrence and is one that is often mistaken for carcinoma. In this type of inflammation, which leads to the formation of a definite, tumor-like mass, in which the diverticuli are buried in fibrous tissue, it is impossible (except microscopically) to distinguish between benignancy and malignancy.

It has been stated that the fact that a history can be obtained of long standing trouble on the left side, which perhaps has been substantiated by proctoscopic examination, it is evidence of diverticulitis rather than

carcinoma. This is an error. In the first place, one can never tell when a carcinoma may become implanted on any chronic inflammation. I have known carcinoma to become ingrafted on strictures that I have observed for ten years. And I have known of many instances, four in my own practice, where both carcinoma and diverticulitis co-existed.

In the 116 cases seen at the Mayo clinic, malignancy was found in 14. In 12 of my cases, 4 were malignant.

The formation of adhesions between the sigmoid and other viscera, such as the small intestine and the bladder, not infrequently happens. In one of my cases a patient was sent to the hospital suffering from intestinal obstruction; at operation we found a diverticulum had become adherent to a loop of small intestine and the inflammation from this contact was the cause of the obstruction. In another case a loop of small bowel had become incarcerated in a hernia, and though this woman had had diverticulosis (probably of long standing), it was only discovered because of the obstruction.

The sigmoid is the most variable organ in the body. It may attain an enormous size. This gives it a wide range of mobility, so that it may become adherent to any organ to which it may reach. I have seen it adherent to the cecum, appendix, bladder, uterus and broad ligaments. With this fact in view we can readily imagine that, in case of diverticulitis, it might form, not alone adhesions, but also abscesses. No one of these, however, would prove as far-reaching and serious as its attachment to the bladder. And this, unfortunately, happens not infrequently. The first evidence of trouble may be, as has happened twice in my practice, the passage of gas through the penis, followed later by feces and pus. A case of adhesion of different loops of the sigmoid to one another, with the co-existence of severe inflammation resulting in the matting together of the sigmoid eventually followed by obstruction, came under my observation in one instance. This patient had hallucinations and delusions which immediately cleared up after an ileostomy had been performed. She died a year later from carcinoma. I was able to obtain an autopsy, which showed a carcinoma engrafted on an old diverticulum.

Perforation of the diverticulum occurred in a patient I saw in consultation. In this instance I was able to make the diagnosis of diverticulitis previous to the perforation. I suggested at the time a colostomy. This was refused and a week later perforation occurred with general peritonitis and death.

Many cases are recorded of perforation of a diverticulum, but not in all cases are they necessarily fatal. Just as in appendicitis, the acuteness of the onset and the virulence of the infection are very often determining factors in the subsequent course of the disease.

A diverticulum may become distended from fecal matter and the feces become inspissated without resulting in ulceration, and subsequent-

ly from a twisting of its pedicle become detached from the bowel to roam around the abdominal cavity as a foreign body.

Telling reports a case of metastatic suppuration in the liver in one instance. Severe hemorrhages, the result, I imagine, of ulceration involving a small artery, occurred in a case of diverticulitis I saw in consultation.

Chronic inflammation of the mesentery, with thickening and shortening of this attachment resulting in angulation and deformity has been known to follow diverticulitis of the sigmoid. Of course this occurs in other conditions, as I have seen it happen in nonspecific inflammation of the colon and there is no reason why it should not occur in the specific infections. Indeed, when I come to think of it, the formation of intramural abscesses in the nonspecific inflammations are of frequent occurrence. In fact, perforation occurred in one case I recall.

The clinical aspects of diverticulitis are duplicated by appendicitis, except that the symptoms are located on the left instead of the right side; so-called left-sided appendicitis.

The differential diagnosis between diverticulitis and nonspecific inflammations of the bowel, with metastatic abscesses, followed by sigmoiditis, may be difficult. However, in the majority of cases, these can be distinguished by a proctoscopic examination supplemented by the x-ray. In the majority of instances the nonspecific inflammation of the bowel is limited to the mucosa, so that there is little difficulty in separating one from the other.

Peritonitis occurring on the left side as a result of pelvic inflammations and ovarian strangulation may be difficult to distinguish, particularly if the sigmoid has become adherent to the adnexa; but the diagnosis can usually be cleared up by a vaginal examination.

Dysentery may, but is not likely to be confounded with diverticulitis. Examination of the stool will show ameba if present.

The acute fulminating type, which is not infrequent, especially when associated with a constricting carcinoma, may give no previous warning of the existence of any pathology until a rupture of the bowel takes place. Two very interesting cases of this description were recently reported in the *British Journal of Surgery*.

We must always bear in mind the possibility of such happenings as the result of constricting carcinoma, without diverticulitis; but this same ending has occurred in nonspecific inflammation.

In nonspecific inflammation we usually have a history of long standing diarrhea, with blood and pus in the stools, and as the symptoms are much more acute and the diarrhea prolonged there is ample time to distinguish between the two.

As tuberculosis of the bowel is usually secondary to tuberculosis

in some other part of the body, and as a patient suffering from tuberculous colitis loses flesh very rapidly, it is not commonly confounded with diverticulitis. There is a form of tuberculosis, namely hyperplastic, which we find difficult to differentiate from both peridiverticulitis and carcinoma. Indeed, only in a microscopic examination can we put confidence.

One thing that has impressed me is the fact that though diverticulosis occasionally involves the entire colon, I have never seen, nor can I remember that it has been mentioned in literature that diverticulitis has occurred in any region but the sigmoid. I do recall one instance of intussusception which was the result of an inverted diverticulum of the cecum and this brings up a very interesting problem as to why pathology so frequently follows diverticulosis in the sigmoid. I believe it is due to the great size, mobility and frequent change of position of this organ, and possibly injury, due to hard fecal matter, may be the root of inflammation in this region. Again, the greatest pressure is exerted in the region of the sigmoid, it being forced into the pelvis where the diaphragm is fixed.

Treatment.—The treatment of diverticulitis should be conservative. When an acute abscess occurs the same treatment applies as in any other part of the abdominal cavity. A stoma is always indicated preliminary to any radical procedure, and it is needless to mention that it should be placed as far as possible from the seat of inflammation. A stoma, by directing the fecal current, prevents further infection, allows the patient to recuperate and puts him in the best position for subsequent radical procedure.

205 EAST SIXTY FIRST STREET.

A STUDY OF THREE HUNDRED CASES, PRIVATE PATIENTS,
SIX WEEKS OR LONGER, POSTPARTUM: WITH REFER-
ENCE TO THE CONDITION OF THE PELVIC FLOOR,
CERVIX AND FUNDUS*

BY BURNLEY LANKFORD, M.D., NORFOLK, VA.

AMONG the methods of preventive medicine, which is the slogan of today, may be justly mentioned all the means employed for better obstetrics. We note a tendency to more careful examination and more frequent observation of women during pregnancy; hospital deliveries with consequent more careful, accurate and aseptic immediate repair of birth injuries; more careful observation and advice during the involution period; a more thorough discharge examination at the sixth week or later, at which time, if further advice or treatment be necessary, or helpful, the patient may be kept under observation as long as may be needed, to restore her to her previous state of health.

With the object of checking up my own obstetric work, and also of presenting a paper for discussion, I have gone over the records of three hundred consecutive cases, with reference to their final examination, taking into consideration during this study the condition of the pelvic floor, cervix and fundus. By the end of the sixth week after delivery, the generative tract of most women will have returned, approximately, to the normal state, and for that reason the end of the sixth week is taken for the discharge examination, this examination being final only in those cases considered to be normal.

Some years ago a gynecologic friend made the assertion that no woman ever passes through a labor without showing evidence of trauma to her genital tract, and that she will always thereafter show some evidence of birth injury. I admitted that he had the preponderance of evidence on his side, and that his statement was, in the main true. It is equally true, however, that not every woman who shows some anatomic trauma, gives a history of subjective symptoms the result of parturition. Furthermore, this particular study would seem to show that not every woman who has borne a child and who has suffered some birth injury, shows either subjective symptoms or objective signs of such injury thereafter.

The gynecologist who does no obstetrics, and the general surgeon

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

who does no obstetrics, see only the obstetric "failures" who seek their aid, whereas the obstetrician who repeatedly confines the same women, and who follows up all his cases, does frequently see what he may call obstetric "successes"; that is, women who have borne one or more children and who yet remain symptom-free. Once in a while he may even find what, in his pride he calls an obstetric "triumph"—that is, a woman who has passed through a delivery and whose genital tract and general condition thereafter, may almost simulate that of a nonparous woman! There is, to be sure, a small enough number of such women to keep any obstetrician humble, but at the same time enough to furnish a goal towards which to work. The higher the ideal, the greater will be the effort to attain it, and the greater the effort, the nearer perfect will be the result in accomplishment, even though the ideal be seldom or never reached.

In this study of the genital tract, beginning from below, the first note was made upon the appearance of the vulva, this being described under three headings: first, those showing no gaping of which there were 115; second, those showing slight gaping, of which there were 139; third, those showing marked gaping, of which there were 46. Slight gaping of the vulva seem to be the normal condition of parous women and this slight gape is not accompanied by any uncomfortable, subjective symptoms, *per se*. This study has also seemed to show that a slight vulval gape does not necessarily mean an impaired pelvic floor, certainly not from a functional standpoint. On the other hand, a marked vulval gape certainly does mean impaired function and any woman showing such a condition must be classed as an obstetric "failure."

The second note was upon the tendency to, or actual presence of cystocele, or rectocele, or both. What I termed a beginning cystocele was found in 24 cases, a beginning rectocele in 10 cases and a cysto-rectocele in 29. In none of these women were the subjective symptoms of sufficient severity to demand immediate surgical procedures, though the 16 women to be mentioned later, who were advised to have an early repair, were all among this number.

The next point to be noted was the tone and condition of the levator muscles. These were judged by their thickness, passive resistance to two examining fingers, and by their power of voluntary contraction. This power of voluntary contraction is elicited by directing the woman to contract the muscle against the examining fingers, and where she does not understand what is meant, or pretends she does not (as some will) the contractility of the muscle can be instantly brought out by directing her to contract her muscles just as she would at the end of a bowel movement. This takes her mind from the vagina as a sexual organ and focuses her attention upon

her bowel and she has no objection to displaying the power of the rectal muscles. The levators were classed "excellent condition" when they were thick, of well appreciable passive resistance, and when the muscle tone, or voluntary contraction was very marked; of such there were 157. The levators were classed as "fair condition" when the above characteristics were present and easily appreciable, but not to such a marked degree as the preceding class; of these there were 102. They were classed as "poor" when they were thin, of slight resistance, showed separation in either vaginal sulcus, and had very poor power of contraction; of such there were 36. Of those in which the levator action was apparently absent, there were six. From a study of these muscles it would appear that where the levators are thick and have a fair degree of passive resistance, and where the voluntary contraction is what was classed as excellent or fair, there need be no fear of functional or anatomic poor results following labor, as far as the pelvic floor is concerned. With the other two classes, one may confidently look for trouble and predict the need for reparative surgery in the near or not very distant future. It is much more conducive to kindly feeling from the patient in the future to predict that she will need reparative surgery, than to say nothing and have her informed at some later date by some confrère that she had been left in very poor condition after her last confinement.

The next note was upon the condition and position of the cervix. The condition regarding lacerations was described as follows: slight, unilateral 80; deep unilateral 30; bilateral 99; stellate 16; and no appreciable laceration 75. The number of cases showing apparently no laceration, came as a surprise to me, because I had thought that practically every woman who had had a baby, had a laceration of the cervix; however if these 75 women had lacerated cervixes, the lacerations were so slight as not to be noted by my gloved finger. The position of the cervix was described under two main heads, though it would vary slightly from either head in some cases. The cervix was called "back," that is, at right angles to the vagina, which is taken as the normal position; and as "in line with the vagina," variations of which constitute the abnormal positions. Of those with the cervix "back" there were 200; of those in line with the vagina there were 96.

The fundus was studied with regard to its position, size, consistency and mobility. The position was classed under three heads, "forward" 175; "mid-position" 45; "back" or retroverted 79. The size of the fundus was estimated as "normal" in 212; or as larger than normal in 85. The consistency was taken to be normal in 237, boggy in 18, and tender in 35. The uterus was found to be "mobile" in 284 cases and "immobile" in 11. In the immobile cases, the fundus was held back so tightly (probably by adhesions) that it could not

be brought forward by a safe degree of force in the manipulation used, or it was so tender or so painful to the woman that it was not deemed wise to persevere in efforts to replace it at that time.

Of those uteri found in backward displacement, the following notes were made. Those replaced at once, either by easy and simple bimanual manipulations, or with greater difficulty by means of tenaculum and bimanual efforts, and thus replaced remained in correct position thereafter, despite immediate exercises calculated to redisplay, and checked up by a further examination, one week or more, later. In this class, there were 40. (Did not return for this check-up examination, four cases.) The next class was of those replaced, but who showed a recurrence of the displacement, either immediately, after the usual exercises, or upon their first return for the check-up examination. These women were fitted with a pessary, which they wore from one to three months, were found to be in good position at the end of the pessary period, and were again checked up by another examination one or more weeks after the pessary was removed. Of such women there were 59. Five required an anesthetic before the displacement could be corrected. One woman wore a pessary three months, one four months, two five months, one seven months, one eight months, all eventually cured. Of those that recurred, whenever the pessary was removed, there were five. One of these last mentioned wore a pessary for seven months (off and on), made several engagements to go to the hospital to have a suspension done, but finally became pregnant with pessary *in situ*. It was allowed to remain until the fundus rose out of the pelvis, after which the pessary was removed and the pregnancy went on to term. (This woman's uterus has remained in good position since this last pregnancy.) There were 24 cases showing a general descensus, 19 showing slight descensus, and 5 a marked descensus.

Sixteen of these 300 women were advised to have an early repair of the pelvic floor. from a standpoint of comfort or function, the function of the pelvic floor, it must be remembered, being a varied one.

In summing up, there were 225 out of the 300 in which appreciable lacerations of the cervix were found, a condition that we cannot do very much to correct, other than by surgery, when such lacerations are found after the puerperium. The problem to be worked out here, in the interest of better obstetrics, is to prevent the cervical laceration, which is far more ideal than a repair, no matter whether the repair be made immediately or later.

There were 119 cases showing some abnormality in the position of the fundus, 74 of them in which the fundus was completely displaced backward, and would certainly have given some future trouble. All but five of these 74 were put back into approximately normal position

and remained so, checked up by subsequent examinations. This seems to show that a very large number of women develop backward displacement after parturition, but also that such a condition is easily amenable to proper treatment. Right here we undoubtedly have a large field for better obstetries, first in the effort to prevent such displacements, and second, in the recognition and treatment at the end of the period of involution. There is little doubt but that the large majority of women who develop backward displacement after child-bearing, will eventually need the aid of surgery to make them comfortable, or to put them in a condition of ordinary physical efficiency.

This leads us to the question, why do so many women have these displacements following labor? It seems reasonable to suppose that one of the chief reasons why this condition occurs so often, is the relatively long time that the lying-in woman spends on her back. A woman in bed after labor, will spend the larger part of her time on her back, and the danger of this continued position becomes apparent *after* the first ten days. During the first ten days, the uterus is an abdominal organ and cannot be displaced because it has not gotten back into the pelvis. After this time however, it becomes a pelvic organ, and it is probably true, in the cases of displacement, that the suspensory ligaments which have hypertrophied with the growth of the fundus during pregnancy, have not involuted as rapidly as has the uterus, and if the fundus be forced back, possibly by straining of the abdominal muscles while the woman is in the dorsal position, or almost certainly by an overdistended bladder, the suspensory ligaments are not able to exert the customary degree of pull in righting the uterus, as they do when the normal sized fundus is temporarily and physiologically displaced. Also, the same intraabdominal forces that ordinarily are exerted upon the posterior surface of the uterus (holding the fundus forward), when the fundus is displaced backward, will exert the same force upon its anterior surface and hold it back, with greater likelihood of keeping it back, because of the larger size of the fundus at this period. It is not the full bladder nor the overdistended bladder of the first week or ten days that brings about this displacement, because the uterus at this time is an abdominal organ and *cannot* retrovert. Therefore, the time to caution the patient against overdistention (often quite voluntary) would seem to be the second and third week postpartum, while the uterus is still large. The ease with which this frequent complication, fraught with so much discomfort and semiinvalidism in the woman's future, can usually be corrected, makes it obligatory upon every physician who does obstetries, to follow up his cases for six weeks (or six months if necessary) in order to leave them in the best possible condition.

At the present time, the subject of prenatal care seems to be largely

filling the literature. The study of even so few cases as those presented here, would seem to show that in our efforts to reduce our obstetric morbidity and mortality, we should not permit our antepartum care, extremely important though that is, to overshadow our care of the patient during the puerperal and late postpartum periods.

530 SHIRLEY AVENUE.

(For discussion, see p. 323.)

SEPTIC INFECTIONS FOLLOWING CHILDBIRTH, OR AN ANALYSIS OF MATERNITY MORTALITY CONSIDERED FROM THE STANDPOINT OF INCREASE OF DEATH AMONG MOTHERS*

BY EDGAR A. VANDER VEER, M.D., F.A.C.S., ALBANY, N. Y.

(Attending Surgeon Albany Hospital)

AT a period of time, especially in the history of our Association, when such vast strides have been made in the treatment of disease, removal of pathologic conditions surgically, operations upon every organ of the body are performed successfully, and the prophylactic treatment of disease is carried to such a high plane, there still remains one department of medicine which, a study of statistics will show, has not kept pace with this wonderful development. I refer to the treatment and delivery of the expectant mother in the hands of the general practitioner. While I do not attend these cases personally, still, as a gynecologist, I am often called in consultation, when infection presents, to see some of the after-results. It seems to me that it becomes our duty to investigate and present the result of our studies in a way that will aid our public health officers in lessening the mortality percentage.

It is to a society such as ours that the general practitioner looks for guidance in his work, and I know of no more important task before us at the present time than in calling the attention, not only of the medical profession, but of the general public as well, to the fact that maternal mortality is not decreasing in a commensurate ratio with the mortality rate from other causes. In fact, I believe it is slightly increasing, and that measures should be adopted—are already being adopted—in order to investigate and report upon this condition. The public should be enlightened upon the facts in the case, and should be educated to cooperate with the medical profession in reducing maternal mortality to a minimum.

Midwives, as far as statistics are available, seem to make a better

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1922.

showing than the ordinary practitioner, which may be explained in two ways: first, the general practitioner is usually in a hurry when attending a confinement case, and makes frequent and unnecessary vaginal examinations with the resultant increase of the chances of infection, whereas, on the other hand, the midwife is content to sit patiently by and let Nature perform her part making few examinations, consequently with a good deal less chance of infecting the woman in labor. Second, the midwife, in a great majority of the cases, attends only the normal confinement, sending for the doctor whenever anything abnormal presents, with the result that if anything goes wrong the physician is charged on the records with the maternal death, and not the midwife, to whom, in many cases, it should be properly attributed, thus, apparently giving the midwife a better record than she should have, and the physician a poorer one. I believe there should be a classification in which both the midwife and physician are in attendance and sharing the responsibility. Statistics do not, as yet, show how many of these fatal cases attended by a physician had first been in the hands of a midwife.

In January, 1923, the Department of Health of the state of New York issued a circular entitled "The Geographical Distribution of Maternal Mortality and Stillbirths in New York State," which gives us some very interesting information. The circular is edited by Dr. Otto R. Eichel, Director of the Division of Vital Statistics, Department of Health of the state of New York, and I am quoting very freely in the following pages from his letter of transmittal to the Commissioner of Health of the State of New York. He first compares the maternal mortality in the state, excluding New York City, for the years 1910 to 1921. The mortality rates are based upon the number of maternal deaths per 10,000 births, including stillbirths.

In 1910 the maternal mortality rate, outside of New York City, from all puerperal causes, was 78; in New York City 66 per 10,000 births. The mortality rate for puerperal septicemia was 28 and 18 respectively. The maternal death rate from all puerperal causes, gradually dropped to the year 1916 when it was 54 and 46 respectively. The death rate from puerperal septicemia dropped to about 20 and 18, where it has practically remained ever since, showing some improvement in that direction.

In 1917 the maternal death rate from all puerperal causes gradually rose again, and reached its peak during the year 1918, when it was 82 and 70 respectively. This increase in the death rate was due to the influenza epidemic, and possibly also to the inability of the woman in labor in the rural district to receive proper medical attendance, as many physicians were away in service. That year the mor-

tality rate, from puerperal septicemia—to which I have previously called attention—remained about the same.

For the year 1921 the mortality rate from all puerperal causes was 60 outside of New York City and 54 in New York City, respectively—not quite so good as in 1916. The mortality in 1921, from puerperal septicemia, was 21 and 12 per 10,000 births respectively, a little better than the year 1916, and quite an improvement over the year 1910, and is the most encouraging sign we have, as it is towards the stamping out of puerperal septicemia that we must concentrate our efforts. Under proper surgical technic puerperal septicemia should be practically abolished. May the day soon come when the statement can be made that puerperal septicemia will be as rare a complication of childbirth as an infected wound following an aseptic abdominal operation is today.

In the year 1922 the legislature of the state of New York, recognizing the great importance of maternal mortality, passed an act creating the Division of Maternity, Infancy and Child Hygiene in the State Department of Health, and although this division has been functioning only a little over a year, yet great good has come from it, especially in collecting statistics in regard to maternal and infant mortality, informing, not only the profession, but the public as well, of the danger to the pregnant mother, and of some of the steps that can be taken to improve the situation.

Study of the mortality rate in the state of New York shows wide variations in different sections but as yet there has not been time enough to investigate the causes and reasons why two communities of practically the same size, with the same industries, the same competent obstetricians, and situated practically the same in regard to health conditions, should differ so widely in their maternal mortality rate. It will take further time and investigation to thoroughly ascertain the causes and apply the remedy.

Possibly the nationality of the inhabitants may have something to do with the problem. It is very well known that women of foreign birth are more prolific and resist infection better than the native born woman, and therefore give a lower maternal mortality rate than in those localities where the majority of the mothers are American born.

Another possible explanation is that in some localities the pregnant mother prefers the midwife, as those of German and Italian descent, and the mortality rate may be increased in those localities where they predominate, because of incompetent midwives; however, whatever the explanation, the fact remains that statistics prove certain localities have a much higher maternal mortality than others.

Another interesting study in maternal mortality is the age of the patient and the cause from which she died. The Monthly Vital Statistics Review, edited by the Dr. Eichel of the Department of Health

of New York, in the Bulletin for March, 1923, gives a very interesting table on this phase of the subject. He places the maternal deaths in two divisions,—those from puerperal septicemia, and those from other puerperal causes. He finds that, beginning at the ages from 15 to 19 the deaths in the first division average about 20 per 10,000; it then drops a trifle to 18 and stays there until about the age of 30, when it takes a sudden rise, and by the time the age of 49 is reached it is as high as 34.

In the other group the line for the ages 15 to 19 starts at about 24, then drops to 28, then gradually rises till at the age of 49 it reaches 110—a very high per cent. The figures for New York City are somewhat lower.

The figures which I have quoted are applicable only to observations made in the State of New York, but it is fair to assume that they hold good in about the same ratio in the other states.

In a period of about two decades many organizations, including this one, have greatly assisted Nature in the cure of many ailments at one time hidden and unknown to our older and able practitioners, and who, had they possessed our laboratory knowledge, would have done equally as good work as the surgeons and medical men of today. Notwithstanding our advances and victories, there are yet many serious manifestations of disease which require our patient investigation. Our laboratories of research, our philanthropists, even our state and national governments were never so thoroughly equipped, so willing to render assistance as at the present time. I am very much in earnest in calling your attention to this subject of maternal mortality, concerning which the general practitioner is appealing to us for aid in our outlying districts, where even midwives are seldom found, and where at certain times of the year, too often no physician can be secured to make the necessary visits required in an obstetric case. When the doctor makes the effort and reaches his patient after a perilous experience with auto, or sleigh, he has in mind other cases he ought to visit, and even contrary to his good judgment applies the long or short forceps rather early, a slight or more serious laceration occurs which Nature always resents, and which becomes the source of an infection which the system is unable to resist. If the laceration is severe the physician may make an effort at immediate repair. He is alone, too often no competent nurse at hand, he is frequently tired, and in a rather doubtful sterile condition he does his work. The building, the log house or the lumber camp, or at times mining district, is in itself a factor that lends aid to an infection. In a few days word comes to the anxious physician that Mrs. B. has had a chill, and that grandmother or a less available attendant says she has done everything she knows to do but the doctor must come at

once, and now, the sympathetic physician makes one of his heroic efforts to reach his patient and after hours of struggling through rough and muddy roads, or fighting snow drifts and perhaps a far worse condition, melting snow, aided by one or more friends or faithful neighbors, he reaches the sick room. There is no chart to give the history since he left the sick mother. He does his best to secure a history while warming himself or taking a bit of nourishment and finds, as he believes, an abscess from an infected suture disgusted at being placed in contact with tissue so unclean. Or he is positive a curettement is needed, and who can estimate the courage required now to aid the suffering one? He does the best he can under the circumstances, sometimes wins a victory, yet too often meets defeat. Is there any wonder that manufacturing interests such as the tanning of hides or leather, the cutting of lumber, have been known to offer a first-class physician and surgeon anywhere from fifteen to twenty-five thousand dollars a year to come and take charge of the employees and their families?

Another channel for relief which I believe should be adopted is the establishment of the small hospital of from ten to twenty beds, either at the village cross roads or larger mercantile centers. To this hospital could be brought, from a distance of ten to fifty miles, the patient who is about to pass through her accouchement, for the proper length of time and where she can receive the now often neglected prenatal treatment. These hospitals should be in charge of a competent graduate nurse, who is also able to make such bacteriologic examinations as may be necessary, and she should have one or two nurses to assist her.

I have talked with several of our best practitioners in these isolated rural districts, and have been much impressed with their views and approval of a medical center, with such a hospital, where they might be able to care for obstetric cases presented from the outside districts. I believe this would be an important factor in dealing with the situation.

In the New York State Journal of Medicine for August, 1923, is a symposium of papers that were presented and read at the meeting of the state society in New York City, May 23, 1923, on this subject. These papers are so complete that it is quite possible for one to make an exhaustive analysis. I believe they are worthy of being reprinted in pamphlet form, with extracts from other sources, together with the report of our committee, for general free distribution. I am quite certain that sufficient funds could be secured from some one of our educational foundations with which to meet this expense, and am inclined to believe it would be well to refer this idea to the committee of which Dr. Mosher is now chairman, and who is so thoroughly

alert, and as desirous as are the other members of the committee to meet what the public, together with members of our profession, desire,—the lessening of maternal mortality.

It is not at all surprising that our Congress has seen fit to take up this subject and has passed a certain bill, which, although possessing points of great value, has not commanded the endorsement of some of the states. This was particularly true regarding New York.

It is a source of great encouragement to us all that our Association some time ago appointed a committee to investigate this very important subject, and that they are making such excellent progress.

Taking all these factors into consideration, it would then appear that the maternal mortality rate is far too high, and that it is time for this and kindred associations to work out a solution of the problem.

28 EAGLE STREET.

(For discussion, see p. 326.)

DUPLEX UTERUS WITH MULTIPLE PREGNANCY: REPORT OF CASES*

BY WILLIAM SEAMAN BAINBRIDGE, Sc.D., M.D., C.M., NEW YORK

PREVIOUS to pregnancy, the pathologic significance of duplex uterus is slight; practically the only symptoms to which the deformity may give rise are dysmenorrhea and occasionally difficulty in coitus. The double uterus is not particularly infrequent; many claim that it is found in about 14 per cent of congenital uterine deformities. The form of the uterus may indicate its double origin and the varieties may range all the way from a slight increase in duplication to two distinct uteri with separate appendages and two vaginæ. Vallisneri relates the history of a woman who was poisoned by cantharides, who had two uteri, one opening into the vagina and the other into the rectum.

With uterus duplex, menstruation may take place every two weeks—first from one compartment of the organ, then from the other—each period lasting two or three days and the patient losing in one month only about as much blood as at a normal menstrual period. During pregnancy the unimpregnated horn continues to menstruate. The dual organ seems to favor conception. Picot reports a double uterus where there were fourteen abortions, and Gouterman cites a case of three children born from the right horn and nine abortions from the left horn of a dual organ.

With double uterine pregnancies, anomalies are not uncommon.

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

Dibierre quotes an instance of a woman who bore one child July 16, 1870, and another October 31 of the same year, both at full term. She had but three menstrual periods between the confinements. In commenting on this case Hirst says: "There must be kept in mind the possibility that one of the children might have been of protracted gestation or the other of premature birth." In my opinion there exists no reason why both of these conditions might not have been simultaneously present in a case of double uterus where impregnations had taken place at different times. Jellinghaus reports a case with a full term child in one uterine horn and a four months' fetus in the other, and another instance where the patient was delivered of a full term white infant from the left horn, and two months later a full term



Fig. 1.

black infant from the right horn of the uterus. Ross relates an instance of a triple pregnancy in a double uterus, and Cleveland describes a discharge of an anomalous deciduous membrane during pregnancy, which was probably from the unimpregnated half of a double uterus.

There seems to be a considerable difference of opinion among obstetricians regarding the extent to which a double uterus may complicate labor. It would seem logical to assume that the unimpregnated half, especially if congested in sympathy with the development of the impregnated side and possibly thickened in consistency by sympathetic contraction during labor, might obstruct delivery to some degree. DeLee reports a very difficult delivery where the child straddled the septum of the double organ. Malpresentations of the fetus and a faulty direction and insufficient expulsive powers are common in double uterine confinements. In the case of double uteri with multiple pregnancies which I herewith present, the patient had two mal-

presentations of the fetus at previous deliveries, but otherwise seemed to suffer but few ill effects during labor from the deformity of the organ. The case is of interest because of the dissimilarity in the confinements preceding and following the one at which the additional uterine compartment was disclosed, as well as an example of justifiable abortion.

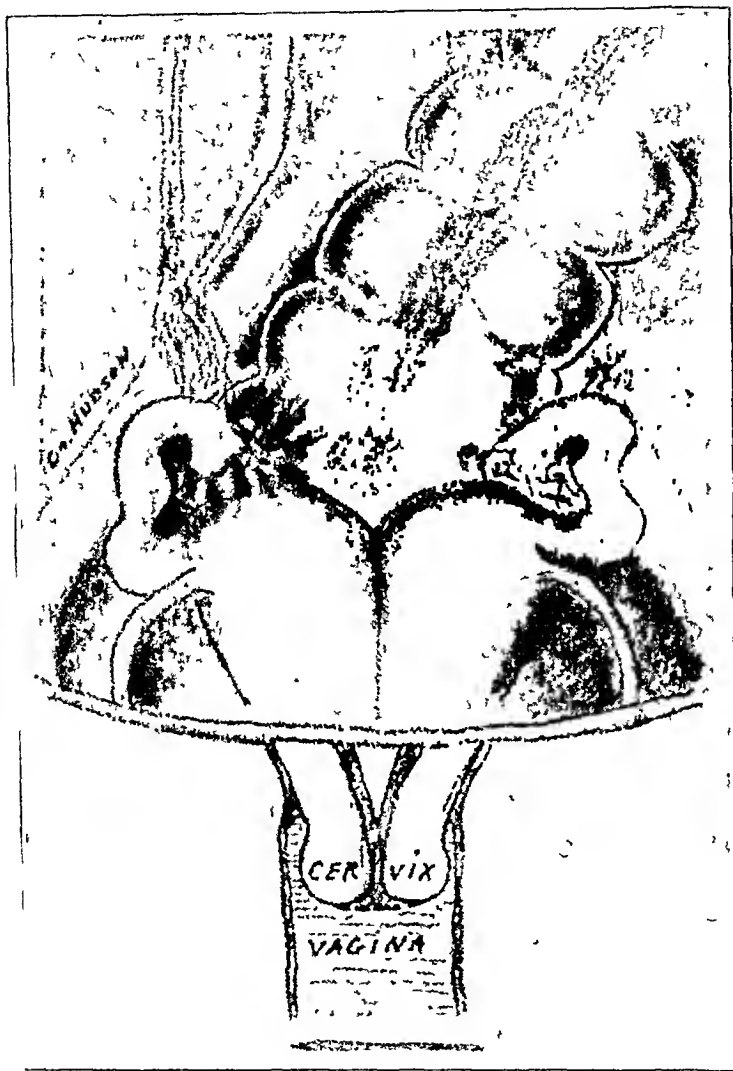


Fig. 2.

CASE 1.—Mrs. J. M., thirty-one years of age, had four children. Menstrual periods commenced at fifteen years, were profuse, painful and irregular. The patient was married at twenty-three years of age. First pregnancy: female, born February 9, 1906, at full term, birth was normal. Second pregnancy: male, born May 9, 1907, stillbirth. Third pregnancy: male, born December 15, 1908, at full term, arm presentation but child normal. Fourth pregnancy: female, born November 29, 1910, at full term, and child normal. Fifth pregnancy: August 21, 1911. Patient had an uncontrollable uterine hemorrhage. I was called in consultation, operated and found a duplex uterus with a single cervix. (Fig. 1.) The right half of the uterus contained the remains of a dead fetus—miscarriage of about four months. There was a living fetus in the left body of the uterus.

In order to stop the hemorrhage in the right side of the dual organ, it was

necessary to curette both halves, as the uterus would not contract and the mother's life was in immediate danger. The patient had an uneventful convalescence and a rapid recovery. She had two subsequent pregnancies; one a full term child, with normal delivery, and the other a miscarriage at three months.

In this case the great variations in the types of pregnancies were probably due to the malformation of the uterus. However, the extra compartment offered little, if any, resistance at delivery. Doubtless, it rose spontaneously out of the pelvis or was pushed up manually during labor.

CASE 2.—In April, 1923, a second case of duplex uterus came under my observation. In this instance, the patient was operated on by me for degenerating fibrocysts of the ovaries and retroflexion of the uterus. When the uterus was brought into position, it was observed that a partition divided the fundus and extended practically to the internal os. (Fig. 2.)

The patient was forty-four years of age. She had been married eleven years and had never been pregnant. Her chief preoperative complaint was backache of a type so severe that she was often unable to stand.

(For discussion, see p. 321.)

FULGURATION OF HUNNER ULCERS*

BY H. DAWSON FURNISS, M.D., F.A.C.S., NEW YORK CITY

THE cause or causes of Hunner ulcers is still obscure, though the most widely accepted idea is that there is some relationship between them and focal infections. Hunner thinks there is also a connection between ureter stricture and this form of ulcer, but as he believes the commonest cause of stricture to be focal infection, the stricture and the ulcer might be, according to this view, a common result, and not an instance of ulcer dependent upon stricture.

These ulcers, while not common, are not infrequent. The history is usually so characteristic that a diagnosis can often be made on it alone. This is frequency, diurnal and nocturnal, of almost clock-like regularity, pain when the bladder reaches a definite degree of fullness, and pain on urination. The urine is generally pus and blood-free, though a few cells, both red and white may be found on careful examination.

Unless a brilliantly lighted cystoscope is used, these ulcers are often missed, but with proper illumination they can be readily seen. There may be one or more scattered over the bladder wall; stellate scars of old, healed ulcers may be seen, leading one to think that at times there is a spontaneous cure, and also that new ulcers may develop in other locations.

The typical ulcer appears as a reddened area, round or oval, varying in size from 0.5 to 2 cm. in diameter. The central portion is denuded of epithelium and may show a slight whitish deposit in the

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1922.

center. On the periphery of the ulcer is seen a network of radiating arterioles. Occasionally these ulcers show a marked edema and may be 3 to 5 cm. in diameter. I have never seen one with granulations, as are found in tuberculous ulcers and ulcerative cystitis. The visible portion is only a small part of the bladder lesion. There is marked thickening of the bladder wall, due to round cell infiltration, often extending to and involving the peritoneum. On over-distending the bladder one can see these ulcers bleed.

Treatment.—Resection of the bladder is a formidable operation. It is difficult to determine just how much to resect as the ulcers are more difficult to see at operation than with the cystoscope. For this reason one is apt to resect an insufficient amount or overdo it. Also there is no assurance that new ulcers will not occur.

To avoid a major operation that did not hold forth any more hope of cure or freedom from recurrence than resection, several urologists decided upon fulguration as a possible means of curing these ulcers. Kretsehmer was the first, as far as a cursory review of the literature has shown, to publish his results. In *Surgery, Gynecology and Obstetrics* he reports a number of cases that had been greatly benefited. I understand that A. B. Ceeil has treated a number with marked temporary relief. In fact they get so much benefit that they willingly return for a second or third fulguration upon recurrence. Kreutzman in the *California State Journal of Medicine*, April, 1922, reports a patient relieved of several years' pain by fulguration.

Kretsehmer, Rathbun and Hyman (personal communications) have used fulguration with more or less success. Their opinions and mine are almost identical, so instead of quoting each, I shall in my conclusions, consolidate our opinions.

Technic.—To properly fulgurate these ulcers the anesthesia has to be good, either general, spinal, or sacral block.

Spinal anesthesia would be ideal except for the relatively high mortality. Under general, except when profound, the vesical reflex is not abolished, and when sufficiently deep, the respiratory excursions are embarrassing. Personally, I prefer sacral block. This gives complete and prolonged anesthesia, with an absolutely quiet bladder. The bipolar current has been used in all. Fulguration can be done through either an air or water distended bladder. With the water cystoscope the bladder capacity should be determined before anesthesia, and should not be exceeded, for troublesome bleeding will be provoked. The ulcer can best be seen through a brilliantly lighted cystoscope, and it is well to have an interchangeable observation lens to locate the ulcers in difficult cases, and to check up on the degree of fulguration.

I prefer fulgurating through a Kelly cystoscope (or some modifica-

tion), with the patient in the knee-chest posture. The patient should be taught this posture before operation as the preliminary injection of scopolamine and morphine, and the excitement of an operation may cause some difficulty in getting the proper position.

In the knee-breast posture the active electrode should be in contact with the ulcer before the current is turned on. If away, there is sparking and the bladder is burned, with the development of sufficient smoke to obscure vision. When in close contact there is desiccation only.

The tendency, I believe, has been to fulgurate too lightly. 'I am sure that the results in the patients whom I have burned deeply and extensively, have been the most satisfactory. My practice is to burn the visible portion deeply, and one-half to one and one-half centimeters beyond, lightly.

Postoperative Course.—There is usually immediate relief of the old pain and the bladder capacity increased one to two-fold. In a few days cystitis is apt to develop, and with this marked frequency. The patient should be put on urotropin before and after fulguration to lessen or prevent infection. Should infection develop irrigations with boracic acid solution and instillations of argyrol are helpful.

In ten days to two weeks there is discharge of small amounts of slough, and perhaps some bleeding. It is four to seven weeks before the bladder lesion is completely healed.

Results.—Seven patients with Hunner ulcer have been fulgurated. Three of these had had resection of the bladder for ulcers, and the ulcer found after operation was either a new development or due to failure to resect sufficiently wide, the latter being the more probable. Since fulguration, nine to twelve months ago, they have had no recurrence of pain or ulcer.

Three patients had fulguration alone; two are free of the old ulcer pain and have normal appearing bladders; one has two small ulcers, pain at times, but on the whole is greatly benefited.

One was fulgurated through a suprapubic incision. This patient had an ulcer involving the left side of the trigonum and fundus, fully 2.5 x 3.5 cm. The operation was done in March and except for a small ulceration noted in July and persisting only a week, and a similar recurrence noted in September and disappearing within a few days following the application of the silver nitrate stick, her bladder has looked almost normal. She has felt greatly relieved, but at times has pain almost as severe as before operation.

One was fulgurated three times, three twice and three once, the best results have been in those fulgurated through the air distended bladder. I think this may be explained by the fact that the fulguration was

more thorough and that the diathermic effect extended to a greater depth.

Conclusions.—Kretschmer, Rathbun, Hyman and I concur in these: All possible foci of infection should be removed.

Resection is a formidable operation with at times spectacular and at times dismal failures.

Fulguration is a simpler method of dealing with the problem and should be tried first.

The results are frequently most gratifying. At least, temporary relief can be counted upon, and if there is recurrence the ulcer can be fulgurated again. The willingness of the patients to submit to second and third fulgurations is a convincing testament of the relief they receive.

Until something better is discovered we shall continue fulguration.

In reviewing my own results, I find that the greatest relief and best looking bladders are those in which the fulguration was the most thorough, and performed under sacral anesthesia through the air distended bladder.

With increased experience and perfecting of technique I feel we can anticipate even more satisfactory results than those already obtained.

54 EAST 48TH STREET.

(For discussion, see p. 323.)

REPORT OF A CASE OF CARCINOMA OF BASE OF APPENDIX*

BY MAGNUS A. TATE, M.D., CINCINNATI, OHIO

Mrs.—consulted me on November 6, 1922. She married 35 years ago, and had two children (both normal labors) and one miscarriage. Twenty-five years ago both ovaries were removed, probably for cystic degeneration. She had had intermittent fever, heart trouble (?), and two years ago a slight paralytic stroke involving the left arm and face. The facial paralysis gradually improved and there remains now only a slight drooping of the mouth.

Her mother died of smallpox, and father of pneumonia, no history of cancer or tuberculosis on either side of family.

The patient is now sixty-three years of age. Aside from occasional abdominal distention she was in fair health until six months ago, when there appeared an uneasiness in the lower abdomen accompanied by occasional pain. This pain became very severe and constant for the past month. Weight, which was 146 pounds six months ago, has dropped to 126. Appetite is poor; there is marked constipation with alternating diarrhea, and now and then she has passed what she thought to be clotted blood; urination is frequent but without pain. Her daughter (in a private conversation) stated that her mother is failing very fast, and that at times is so feeble that she can walk only a short distance, and is then so out of breath that they are afraid that she will fall or have another stroke. Also she has become

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

so apprehensive and nervous that she frequently bursts into tears, and for the past week has not eaten in quantity the equal of one meal.

In appearance the patient is very anemic, and waxy. Her hair is grey, thin and lusterless, eyes somewhat sunken, eyesight poor, teeth very good for a woman of her age, no enlargement of the neck, chest sounds normal, heart action irregular, rate 110, a slight murmur (probably hemie), but no valvular lesion. Pulse is feeble, blood pressure systolic 98, diastolic 58, and temperature normal. The abdomen is quite fleshy, but the rest of the body thin; entire muscular system is very flabby, and in the lower quadrant to the right of median line a pronounced mass (the size of a large fetal head) could be easily detected on palpation and without giving much pain, giving to touch a peculiar feel, doughy in spots, and at other places very hard, with a distinct flat sound on percussion, and auscultation negative.

There was a second degree perineal tear, no prolapse of the anterior or posterior wall, the usual cervical tear of a multipara, and an atrophic uterus. Nothing was detected in the lateral vaults, and vaginal secretion was negative. A few small external hemorrhoids were noted, and nothing pathologic higher up could be felt by fingers or seen by the proctoscope. The patient was sent to the hospital for further study and examination. Wassermann test was negative.

The urine was cloudy, specific gravity 1.015, faintly acid, and contained no albumen, acetone or sugar, a trace of indican and no diacetic acid. Microscopic examination showed numerous large flat epithelial cells, a great amount of mucous and no casts.

X-ray findings revealed no stones in gall-bladder; kidney normal in size, shape and position, and the urinary tract free from kink or stone. Injection test of Colon showed contour and caliber to be normal throughout, except an irregularity at tip of cecum. A marked tumor mass (outlined below the shadow of right kidney) appeared to be above cecum and in front of ascending colon.

The intestinal canal was thoroughly cleansed by repeated doses of castor oil, and on succeeding days, by many enemas. The resulting stools very large in amount, did not contain any blood, but many hard scybulous masses, much mucus and the odor was very foul. The pulse rate and blood pressure remained about the same, but the pulse volume seemed to improve.

If the ovaries had not been removed I would have pronounced the mass to be of ovarian origin, either cystic, dermoid or parovarian. The site of tumor, rather firmly fixed, made me believe that it was connected with the cecum, but the nature of the mass I was not able to state, other than I believed it to be malignant.

The patient was kept in the hospital seven days before operation, which was performed on November 14, 1922. On opening the abdomen (right rectus incision) we were somewhat astounded to find the lower abdomen apparently negative; no tumor mass was present on inspection as was expected from our physical examination and interpretation of x-ray plates. Both ovaries and tubes were absent, and the uterus was small and freely movable. On lifting up the cecum, however, its caliber was found to be markedly increased in size, thickened and flaccid, somewhat like that of a large bladder. Pulling up this flaccid portion of cecum the appendix was found to be very hard and about the size of one's first finger, three inches in length, entering at its base into a mass circular in outline, which was somewhat larger than the face of a watch. The macroscopic appearance of the circular mass, and base of appendix was that of malignancy, and a few large glands in and around the cecum were also noted. The location of this carcinomatous mass was to the side of the cecum, involving the lower third of the appendix, interfering with the normal passage of fecal contents and gas, which gives an explanation of the presence of the tumor mass as found on repeated palpation, and

shown on x-ray plates. The apparent disappearance of this tumor mass (as noted on opening abdomen) was the result of the cleansing of entire intestinal canal during the preoperative hospital stay.

The question at this time was (considering the patient's physical condition) how the case should be handled from the surgical standpoint, and three methods suggested themselves to me. First, a removal of the entire cecum, part if not all of the ascending colon, and about six inches of ileum, followed by an anastomosis of the ileum to the transverse colon, which would have been ideal and logical under ordinary circumstances. It seemed to me, however, that any extensive operation at this time could have only one outcome, namely death on the table, or at best within a day or two.

Second, to close the abdomen without attempting any surgical relief, and a third procedure, which I adopted, was as follows: A circular incision was made around the growth, removing the entire mass, and a goodly portion of the flaccid walls of the cecum. The line of circular incision was freely cauterized, the seared edges were brought together, taking up the slack of cecum, and leaving the entrance from the cecum into the ileum apparently free. The abdomen was rapidly closed without drainage. The specimen was found to be an adenocarcinoma.

The succeeding four days were very anxious ones, as the patient's general condition was one of profound shock and collapse, but from the fifth day on a constant but slow improvement noted, and she left the hospital in four weeks from the day of operation stronger and in better physical condition than she had been for the past six months. One month later she was referred for deep x-ray therapy, and has now received eight treatments.

It is naturally too soon to make any prognosis whether or not the disease was partially or wholly eradicated at operation, or whether the deep x-ray infiltration has been of material benefit, but the patient seems to be making slow progress, eats and sleeps fairly well, has daily bowel movements which are painless, is up and about the house, takes short walks, and now and then an automobile ride. She, however, complains of an uneasiness in the right side, is extremely nervous, but up to present time no tumor mass can be detected on palpation.

(For discussion, see p. 325.)

MATERNAL MORBIDITY AND MORTALITY IN THE UNITED STATES*

BY GEORGE CLARK MOSHER, M.D., KANSAS CITY, MISSOURI

IT is the individual who dies; there is no mass mortality in obstetrics until the records are filed.

The reiteration of statistics, in reference to facts with which we are all familiar, is wearisome and time consuming. The sins of omission and commission of all figures, which could be presented relative to maternal morbidity and mortality, are included in three sentences:

Maternal morbidity and mortality have not been reduced in the United States in the last twenty years; according to the census reports, 16,000 women die in labor annually.

In the loss of mothers, the United States stands fourteenth among the so-called civilized nations, only Spain and Belgium having a higher death rate.

Puerperal septicemia and eclampsia claim over one-half of all the patients who die. Oliver Wendell Holmes, in 1845, pronounced child-bed fever "a private pestilence," and showed that it is preventable. Joseph B. DeLee, in 1923, gives records of 40,000 cases of labor in the Chicago Lying-In Hospital without a death from eclampsia.

The questionnaire of the Committee on Maternal Welfare of this Association, which was sent to every section of the country, contained a request for the views of our correspondents regarding the causes of maternal morbidity and mortality, and for suggestions as to possible remedies for their improvement. Valuable expressions of opinion were received, which could not be embodied in the Committee's report for want of space. So, when our Secretary, Dr. James E. Davis, wrote requesting a paper on this subject, the assignment was considered opportune.

To paraphrase the famous question of one of our midwestern literary lights, "What is the matter with obstetrics?" The letters received are so much in accord concerning the reasons for the opprobrium of obstetrics, that extracts from these furnish a comprehensive answer.

Since we are meeting in the great medical center redolent of the memories of Hodge and Meigs and Theophilus Parvin, it seems fitting to have the opinion of one of the present generation upon whose shoulders the mantle of those great teachers has fallen, Dr. Edward P. Davis, who writes in part:

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

"In Philadelphia and vicinity, as far as I can observe, the condition of obstetric practice is essentially as follows: The rich obtain excellent medical care during pregnancy, parturition and recovery from labor. More of them go to hospitals for confinement than formerly. The interruption of pregnancy, accidents in labor, and bad recoveries, are more the result of dissipation, luxury and degeneration among these people than a lack of proper obstetric attention.

"The poor obtain excellent obstetric care if they enter hospitals. They have better attention than formerly in dispensaries, where a good deal of publicity is given to prenatal, so-called, care. . . . Obstetric care is probably conducted among the poor with greater success than among any others, because they can be taken to a hospital more readily and are under better control. This results in the saving of lives, sometimes of doubtful value to the community. It does, however, secure a positive gain to the population by maintaining the health and working power of mothers, and by keeping the families together and helping the artisan in his domestic fortune.

"The population most in need of good obstetric care is the so-called middle class, with small and limited incomes but with sufficient intelligence, education and refinement to desire and appreciate good medical attention and privacy during illness. Such cannot afford expensive private rooms in hospitals nor the services of specialists, nor can they have high priced trained nurses. Our large hospitals lack greatly moderate priced accommodations for such patients. They are apt to consult general practitioners who undertake confinements in apartments or private houses, without proper facilities, with more or less bad results as regards the health and strength of the mother and child.

"On the side of the medical profession, the middle class medical man, or general practitioner, so-called, is the greatest danger in obstetrics. A midwife, under strict control, does comparatively little harm, but the doctor who does obstetric work to get the medical practice of the family, giving as little time and attention as possible, because it pays but little, is the one responsible for many obstetric disasters. . . . From the standpoint of the medical profession, it must be remembered that the struggle for existence is a bitter one. The doctor must take all he can get and do with it his best. He does not dare refuse obstetric operations because his competitors do them, and yet he cannot do them well. . . .

"On the side of the medical profession obstetrics must be considered a speciality of equal importance with surgery. Gynecology is naturally a department of surgery, and as obstetrics improves, the field of gynecology becomes a narrow one. The fact that large fees have been obtained by gynecological operations, and comparatively small fees are obtained in obstetric practice has resulted in the disproportionate importance placed upon gynecology."

Another teacher and leader, Dr. Franklin S. Newell of Harvard, says, among other things: "I would say that conditions in Boston are not perfectly satisfactory, owing largely to the fact, in my opinion, that a considerable proportion of the obstetric consultation in the surrounding towns and cities is done by the younger surgeons who have had no obstetric training, and whose one idea in delivery is to do a cesarean section, irrespective of the conditions present, and the needs of the individual patient.

"Also, that it is very difficult to educate the older general practitioner to the advantages of prenatal care, but we can impress our younger men. Prenatal care is so comparatively recent that the general practitioner of over forty-five pays little or no attention to it."

From the far south, Dr. C. R. Hannah, Professor of Obstetrics in Baylor University, Dallas, Texas, writes: "Too many of our medical men who do obstetrics

fail to comprehend and put into practice that which they know. Morbidity and mortality of mothers could be lowered if specialists in obstetrics were more frequently called. Surgeons are more often called than obstetricians. The lack of knowledge of obstetrics on the surgeon's part frequently leads to operations, rather than methods of obstetric procedure."

Dr. John E. Talbot, Worcester, Massachusetts, says in part: "I believe the public needs education on the value of good obstetric care. At present it is the least appreciated branch of medicine, even among the educated class. The fault of this situation is due partly to historical reasons, but mainly to the medical profession itself. The public has been educated to require special postgraduate training of the surgical and medical men it employs, and is willing to pay fees commensurate with such special training. In obstetrics, however, the medical school graduate, with experience in only six to twenty cases is expected to handle all the complications and operative procedures in obstetrics. The fees which the public expects to pay are in keeping with the low grade service which is given them under these conditions. . . . It seems to me that hospital experience is as essential to the proper practice of obstetrics as it is to the practice of surgery; I do not believe that the importance of proper obstetrical training is appreciated by the profession itself, outside of the list of those who are obstetrical specialists."

It has long been the popular opinion, in medical circles, that the midwife is answerable for the large percentage of maternal deaths, especially from sepsis.

Dr. Julius Levy, of the Bureau of Child Hygiene, Newark, New Jersey, published in the February, 1923, issue of the *American Journal of Health*, a paper, in which he discusses the comparative responsibility of physicians and midwives as to maternal mortality, and gives a new angle to this tradition, presenting tables and charts setting forth his observations. He shows that in the fifteen largest cities, except only Pittsburgh, there has been a decrease in the number of cases reported by midwives, and of midwives reporting cases; there has been no decrease, rather an upward tendency, in maternal mortality; the centers having the largest percentage of midwives have the smallest percentage of maternal deaths.

Dr. A. M. Mendenhall, Indianapolis, University of Indiana Medical School, commenting on Dr. Levy's paper, writes:

"As a result or rather an intensive investigation, I find that in Indiana, as a whole, the midwife is not a very considerable problem, there being only one locality, a group of four counties near Chicago, where the midwife is much of a factor. In these counties nearly one-half of the women are delivered by midwives, with maternal and fetal deaths considerably better than the State as a whole, especially there being less puerperal sepsis."

In a personal letter Dr. Levy says: "I am not holding a brief for the midwife, but feel very strongly that no progress will be made until we, as physicians, are willing to accept the facts, and then try to develop methods that will correct conditions. . . . If you read my article closely, you will notice that I have been very careful not to use my figures to prove that the results from available data are no worse, even after we make allowance for the fact that their cases are foreign born mothers, who present a higher proportion of multipara and a smaller proportion of risk than our American born mothers."

The inevitable conclusion to be drawn from these expressions of opinion, which typify the feelings of a large number of the thoughtful and progressive leaders of the profession, may be summarized in the comprehensive statement that much of the responsibility for the untoward results of childbirth rests within our own ranks.

The rapid decrease in the number of midwives in practice; the more drastic supervision by Departments of Health over them in the regions where they are still popular, or indispensable because of the lack of physicians; the realization that their work, among the part of the population whom they serve, shows no higher percentage of bad results than the general average of the community; these considerations eliminate the midwife as a factor to be reckoned with in the solution of the question of the continued high rate of maternal mortality.

In the towns and rural districts, and very largely in the cities, the family physician, owing to tradition, sentiment, self-interest or convenience, will care for childbirth, and the average result of his work will represent the status from which statistics will be drawn.

This work will continue to be conducted in the home. The great majority of women who are serving to perpetuate the best elements of the human race belong to the class of intelligent, self-respecting families who are dependent on salaries or weekly wages.

The disproportionately small amount of space allotted to the wards of our hospitals, the high price of the rooms and the general coincident expense makes any but charity hospital service prohibitive to this class of women. Special nurses are equally prohibitive. Obviously home confinements involve much greater risk.

The causes operating to lower the standard of the work of the general practitioner have already been suggested. They may be summarized as follows: insufficient training in our medical schools; lack of hospital postgraduate training which will enable the physician, at least, to diagnose abnormal positions; lack of appreciation of the fact that the process of labor is not surgical; lack of dependence on the obstetric specialist for diagnostic counsel rather than on the young surgeon whose obstetrical experience and preparation may be even less extensive than his own.

It is the part of those of the profession who are fitted by education, by training and by experience to take the lead in instituting a program that will remedy these conditions, and thus raise the standard of the work of the general practitioner.

Obstetrics should be made a speciality of the same rank as surgery. As many hours of the college curriculum should be given to the drilling of the medical student in the principles of the one as of the other. In a larger degree he needs a familiar knowledge of the art of obstetrics, because, regardless of his training, he will, on entering practice be called upon to attend women in labor, long before he will be called to

do operative surgery. He hesitates to call counsel in labor regardless of the condition of the patient, because of the possible reflection on his ability. Without question he can call counsel in a surgical case without affecting his professional dignity because surgery has always, with the laity, been considered the part of the specialist. Not infrequently, when counsel is called, the young practitioner yields his own judgment of the need of obstetrical assistance to the demand of the family for the only generally known specialist, and summons the aid of the surgeon.

Several years ago Dr. J. Whitridge Williams wrote a paper on the teaching of obstetrics, in which some scathing comments were made on the methods which were then employed. There has been some improvement since 1910, but even today, with the enormous shrinking in the number of medical schools, and the practical elimination of privately owned medical colleges, the demand for competent instructors in obstetrics is great, while the quality of teaching is woefully inadequate.

In no other branch of medicine is there so much chaotic difference of viewpoint as in obstetrics; nor is there elsewhere such exhibition of diversified technic as there is in the management of labor. A recent editorial in the *Journal of the American Medical Association*, commenting on this radical divergence of opinion and its disastrous consequences, sums up the subject by maintaining that in obstetrics, individualization is absolutely the key word.

Among ourselves, as specialists, individualization is possible and desirable. Individualization, however, will not solve the problem for the general practitioner. He must be satisfied with a generalization of the minimum standard of obstetric management.

Certain procedures are now recognized as a part of the routine technic of good obstetrics, that a decade ago were certainly individual, especially those relating to diagnosis and asepsis. The general practitioner, who, as a medical student, failed to acquire the fundamentals of obstetrics, or if he acquired them, fails to apply them, accepts his morbidity and mortality as inevitable because he is callous to their significance.

If every general practitioner, nay, if every man who undertakes the care of a maternity case, could be compelled to take a short postgraduate course every five years, induced to occasionally attend one of the clinics now being held annually in many of the large centers, and be urged meantime to read the standard medical journals, the result would be quickly appreciable upon the statistics of maternal morbidity and mortality. These have been so long stationary that they seem, as it were, to have become a permanent reproach to the doctors of this country.

THE RENAISSANCE OF ABDOMINAL SURGERY; THE PASSING OF THE GYNECOLOGIST*

BY JOHN B. DEAYER, M.D., PHILADELPHIA, PENN.

IT is commonly recognized that abdominal surgery and gynecology, as we know it today, owes its renaissance to the introduction of ether and more particularly to the development of aseptic methods of operation, and that with the conquering of pain, hemorrhage and infection, the three great evils which for so many centuries retarded surgical progress, the pathway was opened for the development of modern surgery. But even the most enthusiastic abdominal surgeon gladly recognizes the fact that the surgery of the upper abdomen owes its rise to the fearless and ingenious work of the early gynecologists.

There is perhaps no more dramatic era in surgical annals than that which marks the beginning of gynecologic surgery. The story of that bleak day in December, 1809, when a woman "with her pendulous abdomen resting on the pommel of her saddle" rode sixty miles into Danville, Kentucky, to seek relief for an ovarian tumor that was sapping her strength, reads almost like a work of fiction. She did not come in vain, for she found in Ephraim McDowell a man with the courage of his convictions and willing to suffer bitter and hostile criticism for his temerity in attempting to extirpate the ovarian growth by surgical removal of the ovary itself. This same fearlessness characterized those who came after McDowell. The efforts of his followers, Smith, Peaslee, the Atlees, Dunlap and others to create a legitimate place in surgery for the operation of ovariectomy reads like the strangest story of perverted persecution of men, branded as butchers and murderers, those whose sole object was the relief of suffering womankind.

To these pioneers we owe our everlasting gratitude. Surgical principles and operative procedures which they laid down are accepted today unaltered. Many methods of investigation are the outcome of those which they evolved, and strategy which they employed is still and probably always will be effective.

In the decade that followed these pioneer days it was only in the field of gynecology that abdominal surgery was at all active. With these times are intimately associated the names of Sims and his ingenious treatment of vesicovaginal fistulas; of the elder Emmett and

*Read by invitation before the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, September 19-21, 1923.

his plastic repair of the lacerated cervix; of Warren and his plastic perineal surgery; of Dudley and others in the development of the reduplication of the round ligaments for the correction of the retroverted uterus, etc. While all these endeavors mark the rise of gynecology as a specialty, as distinguished from general surgery, they also hail the advent of the surgery of the upper abdomen as distinguished from pelvic surgery. Stimulated by the fearlessness that characterized the early gynecologic surgeons and encouraged by their triumphant overthrow of prejudice, and what is most important, armed with the panoply of anesthesia and antisepsis, abdominal surgery began its slow and gradual march to its present-day perfection.

There is one very good reason why gynecology should have been the earliest specialty in abdominal surgery. It is no doubt due to the fact that the operative field is superficial and the parts present a greater amount of natural resistance and were more easily drained, so that the risk of operation was not so great as in surgery of the upper abdomen. It is only natural, therefore, that the surgeon of largest experience was to be found among the gynecologists *per se*.

There are one or two commanding figures of the times that can be mentioned without in any way detracting from the glory of that array of lesser lights to whom surgery owes an inestimable debt. In speaking of the renaissance of abdominal surgery one's thoughts naturally revert to the gigantic figure of Lawson Tait. It seems superfluous to more than mention that it was with Tait's epoch-making recognition of the true pathology of pelvic suppuration and his work on the fallopian tubes that gynecology entered into a new era of activity. A close second to this commanding figure is our own Joseph Price, well described as a "bold, rugged, brilliant surgeon," a "militant advocate of the new surgery." Like Tait, Price had to contend against the conservatism of the surgeons and teachers then in authority, and like Tait, he remained callous to criticism and opposition and with singleness of purpose tenaciously forged ahead, bending all his endeavors toward establishing the new surgery. His work was marked by simplicity and thoroughness, and it is no exaggeration to say that, even today, surgery in this country still demonstrates the influence of this master surgeon. We also recall the names of J. Marion Sims, the first to attack the gall-bladder by his drainage operation. But attractive as it may be to recount the early days and dwell on the remarkable progress of abdominal surgery, it is not this aspect of the subject that I have been asked to present at this time, but rather to discuss the effects of the renaissance of general abdominal surgery on gynecology as a specialty.

We, as general and abdominal surgeons, recognize and congratulate you upon the contributions which your predecessors have made. In

the search for truth these men have made invaluable contributions. Few of them knew or thought that the mantle of recognition would fall upon them and that their work would be a beacon light in the future. But little did they care as long as they had the personal satisfaction of having taken a step forward. There is nothing so interesting in the entire history of surgery as this tireless and relentless persistence which led to the conquering of the mysteries of the abdomen. It has meant the alleviation of the suffering of countless thousands and the restoration to perfect health of many more.

Gradually there developed an imaginary line more or less arbitrarily placed, which supposedly differentiated the abdominal from the gynecologic surgeon. The isthmus which joined the two specialties was the ileocecal line, but years of watchful waiting have shown us that it is a false boundary. It is like taking Alsace and Lorraine from France, eventually, in the evolution of mankind, natural boundaries only are able to withstand the onslaught.

A survey of the work that is being done by those who are known in each specialty indicates quite clearly that none hesitates to invade the field of the other, and that the term abdominal surgeon may well be applied to both. While this may indicate the passing of the gynecologist *per se* it would in no way be contrary to prevalent facts, inasmuch as neither the abdominal surgeon, as we have him with us today, nor the man who claims gynecology as a specialty is practising as a specialist in the accepted sense of the term.

There is a time in every new movement when the pendulum swings to one extreme or the other. This is as true in medicine and surgery as it is in politics and religion. It is characterized by closely drawn lines, by prejudices and by selfishness. A survey of the history of the surgery of the abdomen and pelvis will show that we have just passed through such a period.

There has been, and unfortunately still is, a feeling among some gynecologists that the general surgeon should confine his activities to that region which anatomically lies above the ileocecal line. There is thus an attempt to create specialists in a domain where specialism frankly does not exist. It is entirely analogous to a situation where an automobile mechanic would tell you he could bore your engine cylinders, but he could not replace the piston rings.

There is no actual separation between that area above and below the ileocecal line. It is an imaginary, scarcely even a potential separation. It is true that the functions of the viscera in the two portions are not the same, but the problems encountered are closely identical and very frequently coexisting lesions are present.

How then are these to be dealt with? Should the surgeon and gynecologist always be present whenever the abdomen is opened? Even were this in harmony with modern organization and efficiency

it would perhaps be against our better judgment, for just where would the one stop and the other begin? For instance, who would remove the pelvic appendix which has its attachment in the right iliac fossa?

Because of these conflicting problems there has developed, at least among most general abdominal surgeons and gynecologists, a disregard for the supposed domain of the other, each invading whatever area demonstrated pathology regardless of his "supposed" jurisdiction. At first this occurred when operation demonstrated the presence of coexisting lesions, and it has gradually spread so that each specialty came to invade the field of the other for primary lesions. Thus both may more aptly be termed abdominal surgeons, for if the gynecologist is to forsake his birthright he must needs forsake his title also.

A condition such as I have pictured of course presages the passing of the gynecologist. It is not contrary to the facts as they exist today, since finding himself cramped in the narrow confines of the bony pelvis he has emerged into a larger and more liberal field.

In the accepted sense of the term, therefore, neither the abdominal surgeon nor the gynecologist is a specialist, and it would be fitting clearly to meet the issue and openly acknowledge that which both of us are doing by a back door method, for neither of us is devoting attention exclusively to that part of the body which we claim as our specialty.

Anatomically, as I have said, this is impossible. It is not comparable to the specialties of otology and ophthalmology, but is analogous to that of rhinology and laryngology—who would attempt to draw lines between these two?

The solution of the problem lies in openly disavowing that which we have not practiced for years. Should not the so-called gynecologist be trained to deal with the lesions of the upper abdomen, just as the general abdominal surgeon should be prepared to apply his skill to pelvic lesions? Neither should have any temerity when the peritoneum is opened in attacking that which the aseptic scalpel has brought to the light of day. And when the mystery is dispelled and truth revealed, the revealer must go ahead with the same confidence of bringing the case to a successful conclusion, as if the diagnosis had been correct.

Surgery by force of circumstance must fall in line with modern accepted economics. We cannot go along groping in the past and ignoring the present. The principles and reasoning I have elaborated I believe to be sound. During this present generation we will see the refinement of the field of the specialist. The modern surgeon who enters the abdomen should know equally well the anatomy, the physiology and the pathology of all that lies within. The problem

of hemostasis, of asepsis and skill in the gentle handling of the viscera are as applicable to the upper as to the lower abdomen.

This striking change is coming regardless of our individual feelings. The patient of the future will entrust himself for operation to the abdominal surgeon who can accurately deal with any lesion he may encounter. He will not accept the greater risk imposed upon him when he accepts the so-called absolutely pelvic specialist. Unquestionably, therefore, the work of the two will converge and be replaced by the one. It does not mean a replacement of either, but a development of both, and as each becomes a craftsman in the field of the other, as they are doing today, their fields will converge and overlap and they will be merged into a homogeneous whole.

Greater progress, no doubt, is assured by the merging of specialities. As Harvey Cushing has aptly said, "When progress ceases to be made through the incentive studies which the smaller field of work permits, there is every reason why the vagrant specialty should be called back under the wing of its parent, general surgery, from which, under no circumstances, should it ever be permitted to wander too far." The time has not, and may never, come when the specialty will go back to the general surgeon, but the time has come when the abdominal surgeon because of broader experience must assume control of the situation.

It may be bold, but I see in the not distant future a realignment of surgery, and in the picture which rises before me I fail to see any one of the nomenclature of a gynecologist. Expediency in surgery, just as in all processes of evolution, demands that those only survive who are capable of dealing with that larger field which lies between the diaphragm and the levator ani.

Unfortunately, also, in our medical schools where the chairs of gynecology and obstetrics coexist there is rarely harmony and nearly always a duplication of teaching. The obstetrician has reached out for the operative side of the diseases of women. He should content himself with the process of gestation and with the normal and abnormal phenomena which occur during it. There is a serious question as to whom the plastic surgery rightly should fall, but we may say that repairs of the pelvic floor should remain with the obstetrician as long as he gives promise of productivity. However, intraabdominal lesions should be turned over to the general abdominal surgeon and the obstetrician should not be permitted to develop a complete Frauenklinik.

There would thus be developed two specialties whose lines are delineable, whose results would be more apt to be proficient, and of whom we could say they have seen the bidding of the times and have answered it.

THE SIGNIFICANCE OF OCULAR CHANGES OCCURRING IN ASSOCIATION WITH PREECLAMPTIC SYMPTOMS

BY LLOYD MILLS, M.D., F.A.C.S., LOS ANGELES, CALIFORNIA.

THE terms "eclampsia" and "toxemia of pregnancy" have been applied so loosely that, at present, they constitute another of those "diagnostic rubbish heaps" which still litter the field of medicine, but which, happily, are steadily being cleared into their exact component groups.

In the case of the terms in question it has been easy to classify headache, epigastric and colonic distress, nausea and eye symptoms as toxic, in the sense of being related to some obscure renal or hepatic dysfunction or to some disorder of blood chemistry, even in those patients having normal renal function, normal blood nitrogen, lack of hepatic enlargement or tenderness and normal eye grounds. This loose grouping, accordingly, probably has concealed other and more likely origins of many of the symptoms noted late in pregnancy under the common term "toxemia." Any evidence, therefore, which suggests such unsuspected origins of these disturbances may lead to a better understanding of the so-called toxemias of pregnancy, to their better classification, to new points of attack or methods of prevention and, by permitting a clear separation of the very grave from the merely distressing cases, may relieve both physician and family of the heavy burden of anxiety and uncertainty which they now carry in such cases.

This paper is not concerned with the question of frank eclampsia, other than to suggest that the cause which we assume to be the factor in these less grave conditions noted below may be contributory.

The occasional occurrence in pregnancy of changes in ocular muscle balance, in refraction and of those retinal changes usually called "neuroretinitis," is well recognized. It is not generally known, however, that apart from the changes mentioned, the eyes are directly concerned in nearly 90 per cent of all cases of pregnancy, that this concern is a very active one in 40 per cent of this large group, and that the relation is not altogether free from pathologic consequences.

This important involvement of the eyes comes about in consequence of the increasing pressure put upon the optic commissure and tracts by the normal hypertrophy of the pituitary gland in pregnancy. A postmortem study of this region in women who have never been pregnant, made by examining the gland *in situ* from above and also by carefully rongeur-ing away the sella from below, shows an intimacy

of normal relation between the pituitary, and the optic commissure and tracts, which occasions surprise not that 90 per cent of eyes reflect this pressure in pregnancy, but rather that these effects do not exist in all cases without exception, and that their end results are not more generally grave and lasting.

Leconte in 1898 first assumed that hypertrophy of the pituitary was a normal accompaniment of pregnancy. It remained for Erdheim and Stumme to demonstrate this fact in 1908. Their examination of 150 subjects disclosed that the average weight of the hypophysis in women who had never been pregnant was 6.18 grams, the maximum being 7.5. This average in primiparae was 8.47, with a maximum of 16.5. Bandler (*Endocrinology*, 1921) became authority for the statement that this hypertrophy never undergoes involution to its former antepregnant stage.

This enlargement of the pituitary gives reasonable grounds for the assumption of a corresponding hyperfunction, with not infrequent vagaries of overaction and of anatomic relations; it explains many of the so-called preeclamptic symptoms and makes it clear why so many of these apparently threatening cases never climax in true eclampsia.

A brief review of the anatomic situation in the region of the pituitary will explain how enlargement of this gland results in definite and measurable visual losses which may serve as indices of the degree of enlargement and from which, in time, it may come to be possible to judge, in connection with other local symptoms elsewhere in the body, both as to the existence and the degree of functional overaction of the pituitary.

The fibers from the temporal half of the right retina pass back through the temporal portion of the right optic nerve. They form the temporal portion of the right optic commissure, do not decussate and finally make up the temporal part of the right optic tract. The fibers from the left half of the left retina similarly form the temporal portions of the left optic nerve, commissure and tract. The fibers from the nasal halves of the retinae, however, are placed nasally in the corresponding optic nerves, cross in the chiasm and form the nasal halves of the opposite optic tracts. In other words, the nerve fibers which arise from the right halves of the two retinae form the right optic tract and those from the left halves form the left optic tract. Hence, the path of perception of all objects situated to the right of the median line comes by way of the left optic tract, and that to the left of the median line by way of the right optic tract. The pressure of a tumor mass, either in front of the chiasm or, as in the subject under consideration, behind the chiasm, appears, therefore, in a plot of the fields of vision, as more or less symmetrical defects

in both temporal fields, the temporal fields corresponding to the nasal halves of the retinae.

The optic chiasm lies over the center of the sella, though not in contact with its anterior border, and may be pressed upon from below and behind by an enlarged hypophysis when this reaches a volume of at least 0.5 c.c. The size of the gland, as well as those anatomic peculiarities which favor or hinder compression of the nerve, such as the shape of the sella and the form and position of the adjacent dural folds and reflections, determine the differences in the type and degree of the defects in the visual field and probably are factors in the production or lack of headache late in pregnancy. These defects of the visual fields are seldom exactly symmetrical.

The first recorded changes of visual fields in pregnancy were published by Bellizona and Tridonani (*Boll. di Soc. med. and chir. di Pavia*, 1903) and were later confirmed by Forti (*Arch. di Ottal.*, Feb., 1910). They were attributed at that time to vasomotor changes similar to those which occur in hysteria. No systematic studies of the matter were made, however, until Finlay of Havana took up the work in 1919 (*Trans. Internat. Cong. Ophthal.*, Washington, 1922). His excellent work, which I have drawn upon freely; was corroborated by Lancaster and Carvill (*ibid*) who were studying the matter independently, and has since been checked by many others. An analysis of this work shows that changes seldom occur before the seventh month of pregnancy and that they are at their maximum at the time of parturition. Neither the age of the patient nor the number of the pregnancy seems to have any bearing upon the field changes, although this is contrary to what would have been anticipated from the autopsy findings given above. About 30 per cent of the cases show a marked contraction of the fields of vision of over 20° ; 20 per cent have fields which are contracted between 20° and 10° ; and 40 per cent or more show a slighter contraction ranging from 10° down to 5° , which is the minimum regarded as a definite contraction. Some observers take the extreme view, however, that every field will show some contraction if very carefully taken, and that ocular involvement occurs in 100 per cent. After parturition the immediate subsidence of the hypertrophy of the gland, corresponding apparently with pelvic involution, is represented by a corresponding enlargement of the visual fields, the rate of increase being variable and not yet fully determined in any series of cases available to date.

It is clear from the foregoing that in uncomplicated pregnancy the enlargement of the pituitary is enough merely to cause contraction of the visual fields without reducing the acuity of vision, but it is by no means uncommon for some dramatic visual defects to

occur, defects which in the more extreme cases resemble those produced by a genuine new growth of the pituitary. I saw such a case in January, 1923. Mrs. J. B. F., a primipara of forty years, who had passed through the normal delivery of a living child three and a half months previously, gave the history of the rapid contraction of the visual fields of both eyes, noted shortly before the onset of labor. The loss of vision reached its maximum about six hours after the birth and lasted, without improvement, for eight days. During this time only gross forms could be distinguished over an area of about a hand's breath temporally and below the fixation point in the right eye. Only the difference between light and dark could be distinguished with the left eye. Clearing of the vision to normal required another three weeks and was gradual at first. This patient was not hysterical in type or antecedents.

Examination showed no residual defect in visual acuity or in the visual fields. Central vision was 6/6 and Jaeger No. 1 with each eye with a small hypermetropic correction, and the entire intraocular picture was normal, save for a slight fullness and tortuosity of the retinal veins, somewhat more evident in the left fundus. The urine had never contained albumin or casts. The probable explanation of this case is that the pituitary enlargement became so marked, just at the time when the demands upon it were the greatest, that the pressure or drag upon the venous sinuses flanking the sella was enough to hinder their free outlet. This probably gave rise to a rapid edema of retinae and optic nerves of severe enough grade to add a transitory loss of nearly all central vision to the decided loss of the temporal fields, a local change secondary to retrobulbar disturbances. Any great persistence of such venous congestion would lead to permanent structural changes in the retinae, but it is doubtful if these would appear early in the course of such cases, nor should they, from the nature of their origin, be accompanied by retinal hemorrhage, exudates, real neuroretinitis and the other destructive changes noted in obvious toxemia of pregnancy and so often followed by more or less residual loss of vision.

An inquiry among my associates who limit their work to obstetrics showed that nearly every one had observed one or more cases of this sort, in which no clue to the origin of the dramatic, though transitory, visual defect had been furnished by examinations of the urine, blood and general clinical picture. Headaches, nausea, vomiting, epigastric and colonic discomfort and pain (suggested by Michael Creamer as evidence of increased intestinal peristalsis of hyperpituitary origin) had been noted in conjunction with the eye symptoms, all of which are fully explicable as results of local pituitary pressure or of general pituitary overaction.

Further evidence leading to the same conclusions is given in a clinical report by S. G. Dabney (*Kentucky Med. Jour.*, Apr., 1922, p. 260) under the heading of "Toxaemia of Pregnancy with Eye Symptoms," a report typical of those which appear in the literature from time to time. Dabney's patient was a primipara of seven months who had noted impairment of vision when she was several months pregnant. Headaches, nausea and swelling of the ankles were prominent, but the urine was normal at all times. Vision was 20/50 and 20/70. No abnormalities of the eye grounds or visual fields were reported and no Wassermann had been made, but the case was believed, nevertheless, to be one of "optic neuritis with slight atrophy due to the toxaemia of pregnancy." The patient was delivered of a living child at term; she had no convulsions and made an uneventful recovery. The reporter stated that he had seen six similar cases, all of whom retained useful vision. In the discussion of this report each participant reported several cases in which symptoms indicating a preeclamptic state, with obvious visual defects, never climaxed in eclampsia. One reporter declared that he had seen two or three similar and alarming cases during that year but that all had recovered. In one of these a permanent visual defect was anticipated as the patient "had all the symptoms of eclampsia except convulsions." She proved to have normal vision, however, and no symptoms at all since the birth of her child.

It seems apparent that two separate conditions are being confused. The visual defect in one of these arises from its association with frank destructive changes in the retinae and optic nerves, in common with similar degenerative changes in the liver, kidneys and elsewhere in the body, the condition generally recognized as toxemia of pregnancy. In the other form, the ocular disturbance arises out of more or less decided contraction of the visual fields from marked pressure of the pituitary upon the optic nerves, chiasm and tracts, with the secondary effect upon central vision of retinal venous stasis. In the first form the headache, nausea and vomiting may be of toxic origin alone, or in combination with the effects of hyperpituitarism; in the second form they are the effects of a physiologic tumor and of its excessive function. Differentiation naturally is of first importance, and is made largely by examination of the eye grounds and visual fields, urine and blood chemistry in every case of pregnancy complaining of eye symptoms.

Not all of these cases recover without defects. Persistent bitemporal hemianopsia, partial optic atrophy and optic neuritis have been reported as the direct result of the pressure of pituitary overgrowth and it is well known, of course, that any extensive series of cases of toxic neuroretinitis will yield its quota of cases having grave and

permanent losses of vision. The defects noted above as following pituitary enlargement probably represent the final atrophic changes resulting from this pressure, but in a given case it is conceivable that the physiologic new growth has been the starting point for cystic or adenomatous changes in patients already predisposed, or quiescent or incipient pathology may have been lighted up.

Much work is needed to fully establish the facts which are suggested above but the work is not complicated. The continued relation of headache to changes in the visual fields and eye grounds in a series of cases will give impressive evidence; a study of visual fields in all patients presumed to be eclamptic will add still more weight; the coexistence or absence of renal changes in a series of cases showing much contraction of the visual fields must be observed and may yield important findings; the frequency of association between defects of the visual fields and epigastric and colonic distress, and nausea and vomiting, must be noted and a clinical study of the use of a possible opponent of the pituitary suggests itself in those cases where a decided involvement of the visual fields, associated with pressure symptoms of headache and nausea, occurs with little or no retinal change and normal renal function.

This work is offered in the hope that a closer study by obstetricians and ophthalmologists may lead, as it should, to a solution of these problems.

SUMMARY AND CONCLUSIONS

1. The eyes are involved in more than 90 per cent of all cases of pregnancy as a result of the physiologic enlargement of the pituitary gland, which causes different degrees of contraction of the visual fields by pressure upon the optic commissure and tracts. In the more marked cases more or less retinal venous stasis probably arises from the same origin.

2. A temporary but decided loss of central as well as temporal vision, amounting to practical blindness at times, has also been noted in occasional cases, heretofore classed among the toxemias of pregnancy. No gross renal, blood or obstetric pathology is found in such cases, which probably represent an acute obstructive retinal stasis and edema, or the direct effect of relatively excessive pressure upon the optic nerve system, or a combination of these factors.

3. The symptoms in these cases, hitherto assumed to be preeclamptic, of headache, nausea and vomiting, epigastric and colonic distresses, occur not seldom without renal or hepatic disturbance. It seems probable that they arise from the local intracranial pressure of the hypertrophied pituitary as well as from greatly increased pituitary function.

4. The separation of symptoms, hitherto considered to be preeclamptic,

tic, into those of pituitary origin and those arising out of a genuine toxemia of pregnancy, and an accurate knowledge of the relative importance of each, will be accomplished, in a large measure, by systematic examinations of the visual fields and eye grounds of all pregnant women who suffer late in pregnancy from headache, nausea and vomiting, abdominal distress and renal or hepatic disturbance.

930 CITIZENS NATIONAL BANK BUILDING.

UTERINE SECRETION: A BRIEF INVESTIGATION OF ITS NATURE IN THE HUMAN BEING*

By ISIDOR KROSS, M.D., NEW YORK

UNDER normal conditions, all bleeding is followed by coagulation after a definite normal interval of time. The factor of primary importance in this phenomenon is the formation of a blood clot at that portion of the vessel where the loss of continuity has occurred. This, in fact, is nature's method of controlling hemorrhage and, with one exception, is a universal phenomenon under normal conditions. This exception concerns the bleeding that occurs periodically from the uterus, in other words, menstruation.

While much work has been done with a view towards elucidating the factors underlying the causes of incoagulability of menstrual blood, and while considerable information has been obtained regarding the properties of the catamenial fluid, we still do not know precisely what it is that is responsible for this unique phenomenon.

The old idea of considering the alkaline mucus as the underlying factor has long been discarded, since it has been found that a mixture of blood and alkaline mucus undergoes coagulation much more rapidly than blood itself. In a thorough investigation of this subject, Blair Bell¹ came to the conclusion that it was the lack of fibrin ferment that was responsible for the failure of menstrual blood to coagulate. In another communication, he studied a series of hematocolpos fluids and found that the absence of fibrin ferment and fibrinogen were responsible for the failure of this fluid to coagulate. This investigator also performed several experiments with extracts made from the endometrium and from the whole uterus. On testing the effects of these extracts upon the coagulation of blood, he found that they had no anticoagulative powers. These findings are in direct opposition to those of Schickele,² who found that the extracts of uterine tissue, obtained under high pressure, do prevent the coagulation of blood.

*Read at a meeting of the Section on Obstetrics and Gynecology, New York Academy of Medicine, October 23, 1922.

Somewhat along the lines of Blair Bell's theory, may be considered the work of Cristea and Denk.³ These authors determined the coagulation time of the general circulating blood in menstruating women and found it to be within the normal limits. This they proved definitely, and showed that the contradictory findings of Birnbaum and Osten⁴ were due to the employment of faulty methods. On further study, Cristea and Denk found that the calcium determinations were also within the normal limits. Thereupon these authors reasonably concluded that the cause for noncoagulation of menstrual blood must be found within the uterus itself. In the next step of their investigation, they punctured the cervix uteri during menstruation and noted that the blood thus obtained differed in no way from that in the general circulation. This brought them to the conclusion that the solution to the problem was to be sought in the uterine mucosa itself. They formulated a working hypothesis that either the uterine mucosa produced some substance that was an anticoagulant, or that it abstracted from the general circulating blood during its passage through the endometrium some product that was essential to the process of coagulation. They reasoned that if the former were true, a mixture of menstrual and of normal bloods should remain unclotted. This was put to the test and they found, however, that the mixture did coagulate and at that much more rapidly than the normal blood. They also found that an emulsion of uterine mucosa mixed with normal blood clotted more rapidly than the blood itself. This latter finding is in line with that of Blair Bell, and similar to that obtained by Kross,⁵ but is directly opposed to those obtained by Schiebele.² From these results, Cristea and Denk concluded that the uterine mucosa, during menstruation, did not produce any substance that prevented coagulation. This left them with their second postulate, that the uterine mucosa abstracts or neutralizes one of the substances essential in the process of coagulation, and as they found no deficiency in calcium or in thrombokinase, they concluded that the noncoagulation of menstrual blood was due to a deficiency in the fibrin ferment or in one of its forerunners, as a result of its abstraction or neutralization by the mucosa.

Dienst,⁶ who also investigated this problem, found that fibrinogen in the menstrual blood was normal in quantity and at times even in excess of the normal. He also found fibrin ferment in the menstrual blood. The quantity of fibrin ferment in relation to the quantity of fibrinogen was not however sufficient to bring about coagulation. Howell⁷ showed that one part of fibrin ferment can coagulate a maximum of two hundred and fifteen parts of fibrinogen. This author took uterine mucosa, freed it from its blood contents and made an extract therefrom. On mixing this mucous membrane extract with

normal blood, coagulation was prevented and the author concluded that this result was due to the presence of an antithrombin, and on this basis maintained that the incoagulability of menstrual blood was due to the presence of an excess of antithrombin.

In a recent publication,⁵ I showed that the uterine secretion in the rat was able to increase, to a marked degree, the coagulation period of blood taken from rats, guinea pigs and man. In addition to this property, the mixture of uterine secretion and blood after its coagulation, became fluid, as a result of a fibrinolytic ferment present in the uterine secretion. The findings of the above quoted experimental investigation of uterine secretion in the rat taken in conjunction with the phenomenon of menstruation, seemed to point to the solution of the problem of the incoagulability of menstrual blood.

It is fair to assume that the menstrual blood is mixed with the uterine secretion as it passes through the endometrium, and that the uterine secretion interferes with coagulation by delaying it sufficiently to allow the fibrinolytic ferment to dissolve any of the small clots that

TABLE I

NATURE OF AILMENT	COAGULATION TIME OF BLOOD	COAGULATION TIME OF MIXTURE	CHARACTER OF MIXTURE CLOT	RESULT OF INCUBATION
Incomplete abortion	3 minutes	15 minutes	Soft and jelly-like	Completely fluidified
Fibromyoma uteri	3 minutes	9 minutes	"	Almost complete solution
Cystorectocoele	5 minutes	10 minutes	"	"
Ureterovaginal fistula	4 minutes	7 minutes	"	"
Diseased adnexa	6 minutes	9 minutes	"	"
Imperforate hymen	3 minutes	10 minutes	"	Completely fluidified

may form. This corresponds with the clinical observations of Beckwith Whitehouse.⁸

In order to prove that there exists in the human being a uterine secretion similar to that found in the rat, the author employed the hematocolpos fluid obtained from one of the patients in the gynecological ward of the Mount Sinai Hospital. The patient, T. W., aged sixteen, presented the typical picture of an imperforate bulging hymen with a history of amenorrhea and periodic monthly attacks of pain in the lower abdomen for a year. The hymen was incised under aseptic precautions and the thick tarry accumulation of old menstrual blood was carefully saved. About ten cubic centimeters of this fluid were mixed with an equal quantity of blood taken from the median vein of other patients. A control specimen of unmixed blood was also taken in every instance. The hematocolpos fluid was in this way tested with the blood of seven other individuals. As can be seen from Table

I, in every instance there was a marked increase in the coagulation period. The nature of the clot formed by the mixture of the two bloods differed very distinctly from that formed by the control blood. In the former, the blood clot was much softer and much more jelly-like. The tubes containing the mixed bloods and those containing the control bloods were now placed in the incubator. After a period of time varying from one-half to four hours, it was noted that the clot formed in the mixture became softer, and finally in four instances became completely fluidified. In the other three instances, the fluidification was almost complete and the residual clot very small and extremely soft. The clots in the control tubes, on the contrary, became progressively harder and showed absolutely no tendency towards fluidification.

From these results, it is fair to state that the hematoecolpos fluid is thoroughly mixed with uterine secretion that contains a fibrinolytic ferment similar to that present in the rat, and that its fluid nature is due to the action of this ferment. Similarly it can be stated that in the normal individual, the menstrual blood is fluid and that it does not clot subsequent to its escape from the uterus and vagina, as a result of the activity of this ferment. Where the menstrual fluid is composed of more or less clotted blood in an individual whose internal genitalia are not the seat of abnormal anatomic changes, it seems proper to conclude that in that case there is a deficiency of this fibrinolytic or thrombolytic ferment.

(In a personal communication, Dr. S. H. Geist informs me that in a similar unpublished series of experiments, he tested the menstrual fluid for liquefying bacteria and found that there were no such bacteria present.)

REFERENCES

- (1) Jour. Obst. and Gyn. Brit. Emp., 1912, xxi, 209. Jour. Path. and Bact., 1914, xviii, 461. (2) München. med. Wchnschr., 1911, lviii, 123. (3) Wien. klin. Wchnschr., 1910, xxiii, 234. (4) Arch. f. Gynäk. 1906, lxxx, 373. (5) Surg. Gyn. and Obst., 1923, p. 217. (6) München. med. Wchnschr., 1912, li, 2799. (7) Ztschr. f. Biochem. u. Biophys., ref. sb. No. 1061. (8) Lancet, London, 1914, i, 877.

20 WEST FIFTIETH STREET.

MATERNAL AND INFANT WELFARE WITHOUT GOVERNMENT BUREAUCRACY*

BY W. D. CHAPMAN, M.D., SILVIS, ILL.

THE two subjects linked in the title, which I have been asked to discuss, are so widely separated that it has been difficult to consider them jointly. A search has failed to reveal any factor common to individual health and normal functions of government. The function of government is the exercise of those powers and the fulfillment of those duties which protect citizens in their property and family rights and in peaceful pursuits, and also to provide a business office for the transaction of international affairs.

The protection of citizens in their right to their own involves the exercise of police power for the restraint of public offenders, and under this head has come to be classed the temporary curtailment of certain activities in the emergency of contagious disease. This right of quarantine for the public protection is admitted to be just and necessary, but is so only through the duration of the emergency. The necessary exercise of police power is recognized as an emergency right and is held in sharp contradistinction to the necessary conservatism of normal living, with its great tolerance of harmless foible and individual opinion.

Tolerance of all which affects the individual alone is the essence of good government. Intolerance, either religious, moral, political, or social is the rock on which lies the wreck of many fallen governments. To any who would claim that individual health is a national right I make flat denial and refer to the government of Sparta, which fell. Pressed by a great need, the government of Sparta usurped the right to make men, and that state made men of super quality, with a ruthless efficiency which makes the present day Russian system credited to Madame Kollantai seem puerile. The denial of the family as the unit of government wrecked Sparta and furnished warning *par excellence* for all who would invade the sanctity of family practice with breeders' manuals and police compulsion.

The Constitution of the government under which we prosper was conceived in tolerance, and protects the people of the United States against bureaueratic centralization of power save only through the subsidy of state legislatures.

Such a subsidy has been attempted in recent years in numerous lines of endeavor.

*Read at the Fifty-fourth Annual Meeting of the American Medical Editors' Association, Chicago, Ill., October 26, 1922.

The fallacy of Federal Aid plans involving the distribution of cash to the several states in exchange for patronage and weakened sovereignty, lies in the assumption that cash money is an inherent possession of government. The assumption is in error and the moneys of the National Treasury do come from the surplus funds of individual citizens after paying their own current expenses of food, shelter, health maintenance, and recreation. That any part of these individual surplus funds, achieved in thrift, should be appropriated to the personal expenses of other individuals, not legitimate paupers, is out of equity. Also, it is extragovernmental, unless it be conceded that the individual person is government property. Such a concession is denied in theory and in fact by our particular government.

Maternal welfare and infant welfare, then, rest as private incidents of family life now and for the future, and demand consideration and handling by those whom normal duty nominates; husbands, wives, parents and the health advisors of their choice, rather than by volunteer fixers who offer advice to the point of proposed compulsion, without constructive effort in the raising of families and with only theoretical, as against practical, knowledge and with only vaporous generalized advice as against concrete demand and detailed experience.

The medical profession of America has the record of the health experience of the world for some twenty-three hundred years. To spread this record for the instruction and guidance of those in need is its privilege and duty. To those who feel their own competence to procure and interpret that record and to work through without expert advice, the members of the profession should extend charitable humor and nothing different. From incompetent advice vociferously offered by charlatans or demagogues or uplifters-for-pay or their dupes, the profession which knows history and is expert should protect those who look to its members for advice.

Maternal and infant welfare collectively, is the sum total of that welfare individually. Individually, it is a matter of judicious management by one best qualified to advise, chosen from among those available.

It is generally admitted that the members of the medical profession are best qualified to advise, and our various groups of social thinkers admit and claim that they can accomplish nothing without the aid of the medical profession. And so, to that profession again accrues a responsibility to which it has long been accustomed, but with this difference: a comprehensive examination of a large class of citizens of military age about 1918 revealed to the public gaze physical defects long deplored and a source of concern to medical men. Many of these defects were congenital and lent color to a claim in no wise new that the medical profession was failing in its prenatal and post-

natal care of infants. An alternative dictum that the sins of the fathers shall be visited on the sons was uneasy to believe and difficult to explain and generally unwelcome.

A postwar hysteria lent ready sentiment and ready money to the clamor of uplifters-for-pay who draw their salaries from the open pocketbooks of altruistic people.

A group of Bolsheviks, persistently patient in their efforts to abolish democracy in this country through the medium of wrecking our dual form of government and substituting an unbearable centralized bureaucracy, seized a moment of hysteria and a subject of sentiment for their greatest effort at establishing precedent, and furnished the political acumen necessary for the passage of a Federal Maternity Act, whose only function is to subsidize state legislatures and confirm a bad precedent.

These three circumstances operating jointly have evolved a situation in which a befuddled public, realizing its helplessness, is now turning to a bewildered profession groping for its accustomed authority, with a demand for the magic panacea which will relieve all ills. A profession sick with lay boards of control, and lay educational foundations, and lay legislation, and a lost sense of proportion in its handling of patients is ill-conditioned to answer until both shall have purged themselves of erroneous ideas as to capabilities and limitations.

It has seemed to me that the key to the answer lies in a statement that no social thinker, no group worker, no idealist, no optimist has yet evolved a magic scheme whereby maternal and infant well-being can be evoked for all and sundry, the fit and the unfit, by the idiotic expedient of making a law.

Omitting for the moment a discussion of heredity and environment, maternal and infant welfare depend upon two things: the practice of general hygiene and the practice of medicine. Each of those things is an individual practice contingent upon the willingness, the judgment, and the ability of patient and practitioner.

For the patient, otherwise known as the public, neither intelligence nor willingness nor understanding, is to be achieved by bureaucratic order nor government edict. Her receptivity is fixed by the past experiences of herself and her forbears. For the practitioner, neither understanding nor judgment nor ability is to be had in that manner.

Willingness to accept care, and understanding cooperation by the patient are to be had in one way and, I believe, in one way only. That is, by permitting her to feel confidence in the good faith, the judgment, the human understanding and the technical ability of him who would advise.

There is a characteristic of public and private living so pronounced that it may be postulated thus: Where confidence is deserved con-

fidence will be reposed; and in this manner we are led to introspection.

Obstetric practice will continue to be done chiefly in the home and the small hospital. The results obtained and the confidence deserved will continue to depend chiefly upon the individual attributes, technical and ethical, of private practitioners. Granting that the medical profession of other generations has received full measure of the confidence of its public, practitioners of the present generation are entitled to no single rose from the bouquets of our deserving fathers. Either we earn and receive confidence, or we neglect and do not receive. Associated Press dispatches of October 19th last, carried an announcement that the Panel Doctors' Union of England had threatened to strike if further reductions were made in the wages of its members. No more repulsive comment can be made on the decline and fall of an honored profession. Are we in America business men whose business may at any moment be taken over and run by more astute business men? Are we craftsmen whose wages may be fixed by the economic conceptions of insurance companies or lay bureaus? Or, are we devotees of a profession above and apart from business and wages? Plainly, we are a combination of all three. Insofar as the first two dominate the third in the lives and work of individual practitioners, by just so much will the confidence of women in maternity, like that of all other patients, be withheld or withdrawn, and by so much will maternal and infant welfare suffer.

With the waning of the hysteria which we have seen, the public has now turned to the doctor with two questions: "What was it about?" and "What shall we do now?" And upon our answer depends the future trend of popular opinion and action. To inspire confidence our answer must ring true and introspection must be frank, for no amount of public proclaiming will ever make us appear other than as we are.

More responsible than all else for the situation which confronts us seems to have been the unassimilably rapid succession of minor modern scientific discoveries.

In the practice of medicine science and art are strangely commingled, and the rapid rate of progress with its effort at understanding new truths has riveted the attention of the profession much to the detriment of the art of practice. This laudable endeavor to understand and keep pace has resulted in the grievous error of unseating practitioners of medicine from the teaching staffs of medical colleges to make place for scientific investigators and technical instructors, much of whose work would better have been kept beyond the sight of novices in training for the art of practice. This error could never have been made by the profession alone, but was made possible by lay foundation contributions which in return demanded lay domina-

tion as a right. Being dominated, the medical profession has cringed and surrendered its independence of thought and action.

A sentimental rather than practical public has shaped courses for a well-meaning profession to the point where one of the hardest lessons for army surgeons from civilian life to learn was that the care of the incapacitated was a minor incident, entirely beside the normal function of an army. So in normal civil life we are coming to forget that general utility rather than scientific exactness of function is the end and aim of living.

This is not as it should be and has resulted in overhospitalization at exorbitant expense, and in specialization by men without general understanding and by excesses in the field of group practice, all for the sake of the overuse of instruments of precision as against the laborious training and use of the five special senses.

The public resents this occurrence and fails to understand how it came about and wants and will have a general practitioner who, in public, stresses the homely art of relief above his own technical studies. If the profession will not educate such a practitioner the public will take what it deems to be the most available cult and build one by toning up his education a bit, reserving the call upon scientific exactness for emergency use only. They will do this in the name of general utility and they will be right.

In the field of maternal and infant welfare this evolution would possibly start with the midwife or the trained nurse as the active agent and would be costly indeed in health and well-being, but after many tribulations it would be accomplished. It is our duty to save this cost, and our technic must be to deserve confidence rather than merely to claim it.

For instance: We have neglected the puerperium and our public resents that. Proper conduct through that period does not depend upon diagnostic instruments of precision or upon handsome office equipment or upon recent discoveries, but does depend upon two of the special senses and judgment, and what I have chosen to call human understanding. An Albert Smith retroversion pessary, reshaped and fitted, will alone, many times remedy subinvolution and will give comfort through a protracted convalescence. We have failed to use it rightly because somebody has said that the age of the pessary was yesterday, and has failed to offer an adequate substitute. The same instrument with its homely technic of application will very many times indeed give perfect relief, in some empiric fashion, for a troublesome vomiting in the early months of pregnancy; and we have too largely ignored it because it was empirical. For the good of our patients it is well to cling to a limited amount of empiricism, remembering that quinine cured malaria just as efficiently before the dis-

covery of the plasmodium as it ever has since, and that the rules of procedure promulgated by O. W. Holmes more than four years before the scientific reasoning of Semmelweis was announced, will efficiently protect today's patients against puerperal fever of exogenous origin.

The welfare of mothers and infants rests now as before, squarely upon the medical profession, and upon the honesty with which that trust is met, depends much that is important in the future of both.

136 NINTH STREET.

A HYDROSTATIC BAG FOR THE INDUCTION OF LABOR*

BY GEORGE H. LEE, M.D., F.A.C.S., GALVESTON, TEXAS.

IN June, 1922, THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY published a short description of a bag which had been designed to combine the good features of the Barnes fiddle bag and of the Champetier de Ribes and Voorhees bags. It will be recalled that the purpose of the design of the Barnes bag was by resting in the cervical canal, to promote uterine contractions, by distending the cervical canal. The difficulty about this bag is that when it is distended the fiddle shape is lost. It becomes very much the same size throughout; that is, cylindrical in shape, and slips either in or out of the cervical canal. The Champetier de Ribes and Voorhees bags, on the other hand, are designed to rest entirely within the lower zone of the uterus and act as a foreign body, thereby inciting uterine contraction. The Voorhees bag has a small tube communicating with it, and does not in any way serve to distend the cervical canal; consequently, the advantage from its distension is not obtained. The Champetier de Ribes bag has a large tube communicating with it, of from 4 to 5 cm. in diameter, which tube is large to such length as to distend the vulva, and by so doing exposes the patient to infection from without.

This new bag was designed to combine the good features of the Barnes fiddle bag, by having a constricted portion which will rest in the cervical canal so that, when in place, it will distend the cervical canal and also a large portion that will rest in the lower uterine zone and act as an irritant to excite uterine contraction. The distal dilatation is globular in shape and so fashioned that it will rest in the vagina. A small tube of only one cm. in diameter communicates with the exterior, which tube is not sufficiently large to distend the vulva and keep it open. This bag is constructed of rubber fairly heavy, sufficiently so to permit a weight to be fastened to the tube that protrudes from the vulva, when necessary. A year's use of this

*These bags may be obtained from the Kny-Scheerer Co., New York.

bag by the profession has demonstrated its practical utility. The only difficulty seems to be in the fact that the smaller sized bag, as previously constructed, is too large to be introduced in an undilated cervix which has to be opened up by a steel dilator. For this reason arrangements have been made recently to manufacture and place on the market three sizes of this bag, as follows:

Diameters		
Small size:	Medium size:	Large size:
A— 1 cm.	A— 1 cm.	A— 1 cm.
B— 4.5 cm.	B— 6 cm.	B— 7.5 cm.
C— 3 cm.	C— 4 cm.	C— 5 cm.
D— 5 cm.	D— 7.5 cm.	D—10 cm.

It is hoped that the addition of this smallest size will render this bag very much more useful, in that it makes it applicable to practically all cases.

Society Transactions

THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SIXTH ANNUAL MEETING

PHILADELPHIA, PA., SEPTEMBER 19-21, 1923

(Continued from February issue.)

DR. JEROME M. LYNCH, New York, N. Y., read a paper entitled **Diverticula and Diverticulitis**. (For original article see page 269.)

DR. WILLIAM S. BAINBRIDGE, New York, N. Y., read a paper entitled **Duplex Uterus with Multiple Pregnancy**. (For original article see page 285.)

DISCUSSION

DR. DAVID WILLIAM TOVEY, NEW YORK CITY.—I would like to report two cases of double uterus. The first is a case of rupture of a gravid uterus bicornus unicollis, the other is a rupture of a double uterus with large hematocele, mistaken for fibroids with pregnancy.

It is important to recognize these anomalies of the uterus, otherwise grave accidents may occur, as in the case reported, where the septum between the uteri was ruptured, and the omentum drawn into the vagina. What might have been the result, if, in the other case, mistaken for a fibroid, the bleeding had been treated by radium, as is the custom at present?

R. B., aged twenty years, menses regular, two children, sent to the Polyclinic Hospital, bleeding, with a foul discharge and a diagnosis of four months' pregnancy with a fibroid. An attempt was made by the house surgeon to dilate the cervix. As it was impossible to get enough dilatation to remove the fetus and placenta, the cervix was packed with iodoform gauze, the patient put to bed and ergot given. The next day, after a few hours of regular contractions, the pains stopped suddenly. The house surgeon in an attempt to clean out the uterus, passed a sound in its full length, and with sponge forceps he removed piecemeal a four months' fetus, and part of the placenta, and drew the omentum into the vagina.

On my arrival I found the patient shocked. On opening the posterior culdesac, blood and clots were evacuated. A cigarette drain was inserted and the abdomen opened. I found a double uterus, one horn of which had been enlarged by pregnancy, with a ragged hole, larger than a silver dollar, in the uterine tissue of the gravid horn, where it joined the nongravid horn opposite the internal os. This tissue was less than a quarter of an inch thick.

A supravaginal hysterectomy was done at the internal os. She recovered after a stormy convalescence. Examination of the removed specimen, showed a uterus bicornus unicollis, with a ragged hole, the size of a silver dollar, in the septum of the gravid horn between the cornu. Adherent to the edge of this hole, a piece of degenerated placenta, two by four inches, was found. The supravaginal part

was enlarged and had contained part of the ovum and membranes. The non-gravid horn was fully developed, as were the tubes and ovaries.

I believe that after the cervix was packed and ergot given, contractions ruptured the thin uterine tissue between the horns, and the house surgeon passed his instruments through the hole opposite the cervix, and drew down the omentum in his attempt to clean out the gravid horn. The pains stopped suddenly as they always do, when the uterus ruptures.

A. W., 31 years of age, one child four years old, one miscarriage two years ago at three months; menses regular, five to seven days; last menses were ten days before the usual time. Bleeding off and on for the past three months, badly constipated for five weeks. She came to the clinic, complaining of severe pain in right abdomen from the iliac fossa to ribs, and cramp-like pain in the pelvis with bleeding.

On abdominal palpation a hard round tumor above the pubes, reaching half-way to the navel on the right side was found. Vaginal examination revealed cervix and vagina normal, with a round hard mass filling the pelvis, and pushing an enlarged uterus, the size of a two months' pregnancy against the pelvic wall on the left. The diagnosis was a large fibroid, with early pregnancy, fetus dead.

Upon opening the abdomen, a large round bluish tumor presented. It was a large hematocele adherent firmly in the pelvis. Rupture occurred in an attempt to deliver it. A ruptured ectopic tube and broken down ovary were found on the right side of what proved to be one horn of a double uterus. Against the pelvic wall, the left horn slightly enlarged with normal tube, an ovary was seen. A deep sulcus one inch wide covered with vesicouterine peritoneum and the bladder separated the two horns. The vesicouterine peritoneum was separated from the supravaginal portion of the right horn, and a supravaginal amputation removed this horn with the ruptured ectopic tube and ovary. The vesicouterine peritoneum was sewed over the raw surface of the amputated supravaginal cervix. There were two very distinct supravaginal portions of the cervix, but only one vaginal portion. The left horn with normal tube and ovary now looked like a uterus, the right tube and ovary of which had been removed. She has since had a baby. Both these cases had children, but the physicians who delivered them did not discover the conditions present.

DR. JAMES F. BALDWIN, COLUMBUS, OHIO.—I have had several cases of double uterus. In some, children had been delivered without the slightest difficulty, and the deformity was discovered by accident. I had one case of a young girl who was operated on for appendicitis and it was found that she had a one-horned uterus. Fearing that there might be difficulty in child-birth I warned her people that if she married and became pregnant they should let me know or report the case to some competent obstetrician. Some years later she did become pregnant, was sent to me, and was put in the hospital. One of our leading obstetricians was associated with me. She fell into labor, but the pains were inefficient, and after giving her plenty of time we agreed on a cesarean section, which was made in the usual way. The uterine tissue, as anticipated, was found remarkably thin, as there was of course only half the normal amount of tissue present. I excised the tubes from the uterus after delivery so that there would be no more pregnancies. The patient made a prompt recovery.

DR. GEORGE CLARK MOSHER, KANSAS CITY, MISSOURI.—I have seen three cases, somewhat similar, two of which were double uteri, and a third a fetal development of Müller's ducts with a single vagina. The first two delivered themselves without any untoward conditions, and the third one was a case in which I

was called in consultation, where the woman had been in the hands of a professional abortionist, and had an abortion induced with a puncture through the non-pregnant horn of the uterus. She died from a general peritonitis.

DR. H. DAWSON FURNISS, New York, N. Y., read a paper entitled **Fulguration of Hunner Ulcers**. (For original article see page 288.)

DISCUSSION

DR. FRANCIS REDER, ST. LOUIS, MISSOURI.—Possibly a bladder ulcer is of the Hunner type when, after you have opened the bladder you are unable to demonstrate it. That is what I encountered once. A woman, thirty-two years of age, had been in the hands of a specialist for two months and was making no progress. She became dissatisfied and fell into my hands. I saw the specialist and talked with him about the case. He presumed the condition was a Hunner ulcer. She urinated almost every half hour, day and night, suffered severe pain in her bladder, and was rapidly becoming depleted in strength. The specialist cauterized the ulcer on two different occasions. I performed a cystostomy with the intention of excising the ulcer. The ulcer was supposed to be on the left lateral wall, more anteriorly than posteriorly. Carefully examining every fold of the bladder I was not able to find the ulcer. There was an extremely hyperemic condition of the bladder mucosa. The bladder was drained for three weeks. This was eight months ago, and so far she has been free from pain. The desire to urinate is still quite frequent, two or three times at night, and about four times during the twelve hours of the day; otherwise she is in excellent condition and has taken on weight.

DR. BURNLEY LANKFORD, Norfolk, Va., presented **A Study of 300 Private Postpartum Cases with Reference to the Pelvic Floor, Cervix and Fundus**. (For original article see page 275.)

DISCUSSION

DR. GEORGE CLARK MOSHER, KANSAS CITY, Mo.—Dr. Lankford's paper, because it is on a subject that so often is overlooked by the busy man doing a large obstetric practice, is valuable and timely. The average man does not follow up his cases with sufficient care to give them the best possible after-results.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—There are a few things which should not be attributed to poor obstetrics. There is no doubt that in observing our patients postpartum, at times we are very much astonished to find a poor perineal floor and badly lacerated cervix in a case in which we thought we had done excellent obstetrics, which proves undoubtedly that there is a difference in the degree of elasticity of the pelvic floor in women, and in consequence laceration occurs under the best of circumstances.

The most important thing to impress upon the lying-in woman is the fact that it takes fully six weeks under normal circumstances for the genital organs to return to a normal condition, and that after her departure from the hospital at least four weeks should be spent in conducting herself as a convalescent. During the time such women are in the hospital they should be kept off of their back as much as possible. We have our patients lie on the side, and if they can be induced to do so, to lie upon the abdomen. In that way we favor involution and prevent backward displacement. After the seventh day we use the knee-chest position. In those cases in which the bloody lochia persists for a longer time

than usual, we assist the involution by hot vaginal douches and keep the patients in bed a longer time.

DR. JOHN O. POLAK, BROOKLYN, N. Y.—This paper of Dr. Lankford is most timely in these days of antepartum furor. Antepartum care does diminish toxemias, but it must be supplemented by good obstetrics, and that good obstetrics must be supplemented by proper postpartum care by a careful person if the obstetric patient is to get the best. In most of the maternity centers they give casual prenatal care but the patients are so placed sociologically that they do not get the consecutive obstetric and postpartum care that the doctor has mentioned. Those of us who have followed our work know that everything he has said is true; that about 25 per cent of these women, no matter how they are discharged from the hospital at the end of the first two or three weeks, come back with a retroverted uterus because of its lax supports. We try to obviate this as well as we can very much on the line Dr. Speidel has spoken about, yet we go a little further. Our patients in the wards have to spend their day divided into four parts, and three parts on the abdomen and on the sides. We then teach every woman and every nurse how to put a patient in the knee-chest position and allow air to go into the vagina to inflate it. We have adopted the "monkey trot," walking on all fours, and by that simple procedure we have reduced the number of retroversions from 25 to 2 per cent. His suggestion of the use of the pessary is most timely as we are doing too much operating for retroversion, and those who do retroversion operations find a large proportion relapse, really a larger number than those where we used to use the pessary. If we can get the cervix and the pelvic structures in good condition, as can be done when we adopt intermediate repair of the cervix in pelvic floor lacerations, and follow out postural treatment during the lying-in period, supplementing it with a pessary, we will have a larger percentage of well women who will not fall into the hands of surgeons.

DR. ABRAHAM J. RONGY, NEW YORK CITY.—It is my impression that pelvic defects after childbirth are not of local but of constitutional origin. In some women the muscular structures are such that they will stand labor, while others will not stand labor, no matter what you do, and there will always be a number of lacerated cervixes and lacerated perineci. The same thing holds true with regard to abdominal viscera, dropped cecum, and dropped abdominal structures. Of course, immediate attention to improve the tone of the muscular structure is in order, and I think Dr. Lankford has called our attention to one of the most important things in connection with postpartum care, particularly in those cases that have a dropped uterus, and if the uterus is supported by pessary for a certain length of time it may return to the normal position.

Then comes the next problem, as to what to do with the second stage of labor. Shall we permit a woman, who has reached the second stage of labor, after the cervix has been thoroughly dilated, to continue the labor and allow her to press for two or three hours until the head presents, or shall we, after the cervix is fully dilated a certain length of time, deliver these patients and prevent laceration of the pelvic floor, and if she is lacerated, repair it right then and there? Those women, whose muscular structure is not what it should be, if allowed to remain a long time in the second stage of labor, do a great deal of damage to the pelvic floor, and are better off if they are delivered gently by forceps.

It is still a question in my mind, whether any plastic work should be done on the vaginal vault, if the woman has only one baby. The birth of the second child not only undoes the operation, but it very often causes dystocia.

DR. JAMES E. DAVIS, DETROIT, MICH.—During the past year there came to my notice an incontrovertible argument for immediate repair of the cervix. A young woman, multipara, died after her third childbirth from hemorrhage originating in a small tear in the cervix. It was my opportunity to do a very searching autopsy upon that case, and there was absolutely no evidence whatsoever of any cause, for death other than that of loss of blood. The laceration of the cervix could easily have been repaired immediately. Other measures were adopted which did not succeed in stopping the hemorrhage, and the patient died within three hours after childbirth. While that is one of the striking arguments for immediate repair, I do not mean to advocate it in all cases and say that they call for an immediate repair, but there are certain cases in which the indications are clearly defined.

DR. MAGNUS A. TATE, CINCINNATI, OHIO.—When a woman bleeds excessively after she has her baby, any good obstetrician will try and find out from where and why she is bleeding, and if the cervix is badly torn he will repair it. That is ordinary, good common sense. If she is not bleeding very much, we do not pay any attention to the cervix primarily.

DR. LANKFORD (closing).—When I first began the practice of medicine I thought the pessary was a back number and that it was a confession of ignorance to use it, but in the last three or four years I have come to consider it a most valuable instrument, and I am glad to find that the rest of the men uphold me in its use. Some of these women had short anterior vaginal walls and cervical lip. Some of these women have constitutional conditions which cause displacement. The short anterior vaginal wall causes backward displacement of the uterus. I learned from Dr. Polak several years ago the value of the kangaroo walk or monkey trot which has a great deal to do in correcting backward displacement of the uterus. I have induced a great many of these women to use the monkey trot, and some of them do it after they leave the hospital and are out of my immediate supervision. My mistake has been in not making them do it while they are in the hospital. A woman will very often allow her bladder to overdistend voluntarily. If we cautioned her against it and told her the reason why, the displacements would be fewer.

DR. MAGNUS A. TATE presented a Case Report entitled **Carcinoma of Base of Appendix.** (For original article see page 291.)

DISCUSSION

DR. HUGO O. PANTZER, INDIANAPOLIS, IND.—I had a collateral experience in the last few weeks in a patient who had similar condition. I found a mass of almost calcareous feces, removed partly by most assiduous efforts before operation, and the balance after operation. My patient had a widely diffuse inflammatory swelling in the wall of the upper ascending colon, with abscess area and rectal temperatures from 99.5° to 102°.

DR. JAMES E. DAVIS, DETROIT, MICH.—Just a word before Dr. Tate closes the discussion. I have just inquired where the tumor was primary, and he told me he thought in the appendix. That is an interesting statement in connection with this case. Cancer of the appendix is not very malignant, but it does produce obstruction which, of course, will very readily kill the patient. This thought may have some bearing on this case.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I want to say a word especially in reference to the operation performed by Dr. Tate. Excision of the colon in this case would have been a typical operation. An ideal operation was not made. Why?

Because this patient was paralytic, almost dead, regardless of her physical condition. With this operation she got well and is likely to live a few years more. With a radical operation she would have died on the table or within a few hours. Dr. Tate displayed good surgical judgment in the management of the case.

DR. GEORGE CLARK MOSHER, Kansas City, presented a paper entitled **Maternal Morbidity and Mortality.** (For original article see page 294.)

DR. EDGAR A. VANDER VEER, Albany, N. Y., read a paper entitled **Septic Infection Following Childbirth, or an Analysis of Maternity Mortality Considered from the Standpoint of Increase of Deaths Among Mothers.** (For original article see page 280.)

DISCUSSION ON THE PAPERS OF DRS. MOSHER AND VANDER VEER

DR. EDWARD SPEIDEL, LOUISVILLE, KY.—I would like to enter a protest against some of these statistics in regard to puerperal infection, as they are unreliable. Many cases of latent tubercular or gonorrheal infection become active after the birth of the child, and are inevitable. I make that statement because fully two-thirds of the cases of puerperal infection in our city hospital in Louisville on investigation have proved to be due to such causes, and statistics taken from the general reports of large cities include many cases of that kind and therefore create an erroneous impression. There is no doubt at all but that there is plenty of room for improved obstetrics, but obstetrics should not be charged with such improper death results.

Another thing; you cannot improve obstetrics as long as the general practitioner, who treats pneumonias, influenzas, scarlet fever, and other infectious diseases, and treats minor surgical suppurating wounds, does the majority of obstetric work in this country, with very poor pay and goes into surroundings in which asepsis is impossible. The difference in the death rate between midwives and such a general practitioner can be ascribed to the fact that the midwife does not come in contact with these infectious conditions. Until communities pay for good obstetric work and see that proper care is given the mothers, such as we now have in certain maternities, it is up to the women to provide better obstetric care for themselves.

DR. JAMES E. DAVIS, DETROIT, MICH.—Whether we believe the statistics or not, if we choose we can discount them somewhat, yet a very serious matter is before us. I have no doubt that the statistics are nearly correct. I do not think the last speaker (Dr. Speidel) has given sufficient reason for doubting these statistics. There is one point concerning which I wish to differ from him, and that is the importance of gonococcic infections. It has not been my experience that patients die very frequently from gonococcic infections. Those patients that die usually have multiple infections, streptococcic, staphylococcic, or colon contaminations with gonococcic infections, but with a single gonococcic infection I do not find there are many women who die therefrom.

I am very sure in our section of the country that the chief difficulty does not lie with the training of our young men in the undergraduate schools. The young men at the present time are exceedingly well trained. The great need today is for training of a postgraduate character, and just as soon as we remedy that part of our work I think our statistics will change. An association like this ought to be insistent in driving home such statistics as we are confronted with, and we ought to point out what are the reasons for these statistics.

cases is questionable. I still feel that I must differ with Dr. Brodhead in regard to the general run of dry labors, because usually a woman, especially a primipara, whose membranes have ruptured when the cervix was not fully dilated, does not go through labor as easily as one whose membranes have been maintained unruptured until the cervix is fully dilated.

In dealing with dry labor I believe we are sometimes puzzled as to what course to follow when we are told that Nature must be left to her own devices. After a woman has been pounding away for 12 to 24 hours, we often wish we had done something to aid in dilating the cervix and saving the patient exhausting pain and some of the after-effects of the prolonged labor. While usually we should give a patient plenty of time to deliver herself, we ought to be ready to interfere after labor has been given a trial and there have been no definite results. I have had to be quite radical at least in one instance, in which after rupture of the membranes and draining away of the fluid it was found best to resort to cesarean section. The patient was a young woman, 19 years of age, with a long conical cervix, which after four days' labor showed absolutely no change. It seemed that introduction of the bag would be of no use, and it would take 24 to 36 hours to get results, and in the meantime the baby would be lost. So I did a cesarean and the woman left the hospital in two weeks with a live baby. Another class of cases in which the bag can be used to advantage is in multiparae who have had previous labors, probably instrumental, and where there is scar tissue which makes labor distressing. In such cases the bag helps a great deal.

So I congratulate Dr. Brodhead on his results in this well-cared-for series of cases, but whether one in a hospital service could show such favorable results I am inclined to doubt. As a rule we can follow a waiting policy, but not too prolonged. If at the end of twenty-four hours satisfactory progress is not being made, some form of interference is indicated, not only for the sake of the mother but for the sake of the child.

DR. HARRY ARANOW.—It seems to me that a paper of this sort does not lend itself to discussion. Dr. Brodhead presents a set of carefully prepared facts and we cannot argue, but we can try to make a few deductions. One fact conveyed to me as a student was that rupture of the membranes was a serious complication of labor. When it occurred it thoroughly frightened me, and I felt that I should attempt to interfere, but as time goes on I find that I interfere less than previously. I am tempted to interfere where the water has pretty well drained away and the cervix is short and thick. Just recently I had a case of this character in a woman with a just minor pelvis and the water had drained away at the onset of labor. I felt that if left alone labor would continue for days, so I inserted the bag and a practically normal delivery followed. Evidently Dr. Brodhead does not think that any special treatment is necessary except to care for the obstetric condition that is there. Dr. Brodhead must have come across some of the very serious cases one sees in consultation, those that have been in labor for days and have to be helped out.

Another point that must be considered is the danger of infection. In prolonged labor after rupture of the membranes microbes enter the amniotic sac and even reach the placenta. Then again, we must remember that these cases were handled by Dr. Brodhead himself. I am opposed to the use of the bag in the late stages of labor when the head is well down, as it may get one into trouble. It is better to pack the vagina with cotton or gauze against the cervix and against the baby's head. Dr. Brodhead brought out the fact that he does not think that dry labor causes occipitoposterior presentation. How often does occipitoposterior cause rupture of the membranes? I am under the impression that with an occipitoposterior

ful in the hands of some private physicians, and in the better maternity services. We need more specialization in obstetrics. Those who practice this branch of medicine should give it enough time and attention to do it well, or they should leave it alone. The adverse surroundings, lack of aid and suitable equipment found in private practice, is often given as an excuse for bad results. In Brooklyn, in New York, and, I doubt not in other cities the out-patient departments of maternity services are conducted under supervision, with little assistance, in surroundings so bad that none worse can be found, and yet with results, as to complications, morbidity, and mortality, so good, that they rival those of the best equipped maternity hospitals. In effect this sort of maternity work in the tenements is private practice under the most adverse conditions. If such results can be obtained by some private physicians and hospitals, this should be required from all. If I speak of the Lying-in Hospital, I mention it as a type and because I know its workings. Not long since, *we completed four and a half years showing over ten thousand deliveries without a maternal death, in the tenements.* During that time, however, of the cases who could be given better care by sending them from the Outdoor Department to the hospital twenty died. The Lying-in Hospital is not unique in this respect. Such results can be obtained in private homes, in the tenements, in the slums, in country districts, and in hospitals, if those who practice obstetrics will make use of the training which is available today, use surgical principles, not do too much, and yet interfere quickly when it is necessary. Then we will have better obstetric results. Another thing; we may rest assured that rapid progress will not come until the people themselves awaken to the situation and demand better results and cooperate in efforts to obtain them. Hospital populations are becoming well educated, they are willing and eager to follow instructions, to present themselves at regular intervals during pregnancy for observation, examination, and advice. In the Lying-in Hospital service, which delivers annually something over five thousand women, eclampsia was formerly a very common and much dreaded condition. Now we do not have enough cases of the eclamptic stage toxemia to provide our interne staff, pupils, and nurses, with an adequate idea of what eclampsia can do. This change has occurred within a few years. Eclampsia is treated before it occurs. It is but a stage in toxemia. If symptoms of toxemia begin to develop they are detected early, and treatment is begun right away, as though eclampsia were imminent.

Bad as the situation undoubtedly is at present, improvement is coming much faster than we may realize. We have but to look back a generation and note the obstetric conditions and practices of that time. There were very few maternity departments and hospitals then. Training schools for nurses found difficulty in securing the required obstetric training for their pupils. We had only to select the training schools and indicate the number of pupil nurses we could utilize. It is far different now. Inconvenient as it sometimes is to feel the shortage of pupil nurses in this work, in a large sense it is well, because there are more places in which obstetric training is given. General hospitals are adding extensive maternity departments. Large maternity hospitals are springing up all over the country. In towns it was rare to find a hospital of any kind; now many of the small communities have some kind of a hospital, some of which are modern and well equipped. In practically all of them provision is made for the care of obstetric cases. Hospitals of themselves do not make competent obstetricians, but it means that more doctors and nurses—some of whom will later practice obstetrics—are given training in this branch of medicine, in hospitals large and small. At the Lying-in Hospital, our interne staff members serve for four months. It is about as long as they can endure the intensive training in simple and complicated obstetrics. We consider these men our most satisfactory postgraduate pupils.

DR. JOHIN W. POUCHER, Poughkeepsie, N. Y.—We have heard in the discussion of these papers about the statistics of puerperal mortality, these statistics being more favorable concerning cases in the large cities. I want to say a word or two for the rural districts. In the large cities we have the advantages of modern education of both medical students and attendants. We have efficient outdoor departments and up-to-date maternity hospitals. We have efficient doctors and health settlement workers. There is everything being done to educate not only the doctors and nurses but the people themselves. The rural districts, according to the statistics quoted this morning, are worse off than the large cities. I am speaking now of the rural parts of the country itself. For thirty-five years I have been doing consulting work through a section of New York state and during that time have run across a great many of these cases, and I think I can tell you something regarding the reasons for their frequent occurrence. In the days when I was a medical student our only obstetric work was a little manipulation with the mannikin and a few didactic lectures. The only delivery I saw in my student days was when my old preceptor in the Berkshires went to sleep one night and refused to be awakened, and I was obliged to officiate at the delivery. He told me afterward, that was his object in going to sleep. I went through college and then out into the country where I practiced for two years and during that time I did considerable obstetric work. I do not remember having a fatality occur during that time, but that was more good luck than good management.

We are confronted in the country by two or three unfavorable conditions, one of which is the growing scarcity of practitioners. None of the young doctors who are educated today are going into the country to practice. There is no criticism about that if they can do better in the larger cities. We are depending upon the doctors who are educated as I was in my day, and who received a very meager education on this subject. Some of them have progressed rapidly since that time. There are men you can teach, and there are men you cannot teach. Some of these I would just as soon trust in a case of labor as any one I know. I would do cesarean section or any operation upon their patients who had been days in labor, and I have done it when they have made an attempt with forceps and failed, with universal success.

There are two things about technic, the preparation of the patient as well as the preparation of the doctor. All your rubber gloves, all your preparation will not avail you anything if you have a filthy, dirty patient to work with, and that is part of the conditions that we have to meet, especially in country practice.

There are in every section of the country medical men who have not progressed with the times, men whom you cannot reach with your literature. The medical society does not help them because they do not attend meetings, and it is from these men the consultant usually gets his cases, usually too late to do anything for them. We must direct our efforts toward education of the patient, if we want to reach these people. When prenatal clinics or the district nurse reaches the rural sections as they have the large cities, we shall have the same good results, and not before.

DR. O. M. GRUHZIT, DETROIT, MICH.—There are three main factors to be considered: the patient's economic condition, her intelligence and the medical care and skill available to her.

A patient with limited means in many cases cannot afford the same medical service as her wealthier sister. The call for physician is delayed at many times to the last minute to curtail the expense even in the face of somewhat alarming symptoms. In many communities the lying-in hospitals associated with civic administration do not fulfil their mission as many women hesitate to take advantage of them because of their false pride and fear. The degree of intelligence of a patient concerning the puerperium to a large extent increases or decreases the dangers of

infections, likewise the failure to observe hygienic methods coupled with ignorance as to the grave consequence from undue exposure to contamination.

To reduce the death rate among the childbearing women in this country from a high level of 20,000 per year, the economic condition will need improvement in many instances.

There is a fertile field for extensive education among a large class of pregnant women along the lines of personal hygiene.

DR. BURNLEY LANKFORD, NORFOLK, VA.—The men at fault at the present time are those who are not interested in obstetrics, but who think they have to do it to keep their family practices. If societies of this type and the various medical societies throughout the country would organize obstetric sections, and get those men who have to do obstetrics interested, and get them willing to take some time every few years for postgraduate instruction, much can be accomplished. If this body would enlarge its membership as much as possible, I think the day will be hastened when more people will put their trust in the doctor than in the midwife. I think this Association and kindred associations should propagate the value of rectal examinations. Of course, that is an old subject and more or less hackneyed. Men of this society do not fear vaginal examination as they know how to make it, and their patients do not need frequent vaginal examinations. It is surprising to know with what carelessness the average practitioner of forty-five and fifty years of age does vaginal examinations. I believe that is one of the chief reasons we have so much sepsis. If these practitioners can be trained to make rectal examinations and learn that in the average case they can make a complete diagnosis through the rectal touch and not make half a dozen vaginal examinations during labor, much good, in the aggregate, will result.

NEW YORK ACADEMY OF MEDICINE

Section on Obstetrics and Gynecology

Stated Meeting, November 27, 1923

DR. WILLIAM E. CALDWELL IN THE CHAIR

DR. W. HALL HAWKINS reported **Two Cases of Inversion of the Uterus.**

Both cases occurred in the homes while the patients were under the care of midwives and were admitted to the service of Dr. Frederick W. Rice at Bellevue Hospital.

CASE 1.—Mrs. A., admitted August 29, 1922, para i, age eighteen, was delivered spontaneously at full term after a short easy labor. The midwife told the ambulance surgeon that the patient began to bleed profusely as soon as the child was born and following her endeavor to remove the placenta by pushing on the fundus and pulling on the cord the inversion developed. About thirty minutes after the accident, the patient was found very pale and almost pulseless; although she was not bleeding at the time. The placenta had already been separated from its attachment to the uterus which was near the fundus.

The ambulance surgeon immediately put on a pair of sterile gloves and by means of his fist reinverted the uterus, and packed it with gauze. Pituitrin 1 c.c., morphine grs. $\frac{1}{4}$ were given and the woman was removed to Bellevue Hospital in profound shock, with marked restlessness ending in coma. Pulse was 140 and very weak, fundus hard and felt in midline. Examination of the vagina showed there was a second degree laceration. Two pieces of gauze were removed from the vagina and cervix. No laceration of cervix, and no bleeding at this time. Measures to combat shock were instituted immediately but the patient never reacted, dying two hours after admission.

CASE 2.—Mrs. B., admitted September 29, 1923, para ii, age twenty-four, had been delivered normally 18 months before of a full term baby with no complications during labor or puerperium. In this case, it was about an hour and a half after the accident before the ambulance surgeon was called. He found the woman showing signs of severe shock with only slight hemorrhage, and the uterus with the placenta still attached protruding from the vagina. He separated the placenta and then made an effort to replace the organ but after a short trial found it was impossible so he wrapped a towel about the uterus and rushed the patient to hospital. Morphine gr. $\frac{1}{4}$ administered.

On admission the patient was practically moribund, skin pale, cold and covered with a clammy perspiration, pupils dilated, breathing shallow, pulse barely perceptible. No effort was made to replace the uterus. Measures were immediately started to combat shock but to no avail, as she expired fifteen minutes after admission. There was only very slight oozing from the inverted uterus. The placental site was near the upper left part of fundus and adherent to it was a bloodclot with minute pieces of placenta. Uterus was large and very edematous from strangulation. No autopsy.

DISCUSSION

DR. CALDWELL.—I can recall only two cases of inversion of the uterus. One occurred at the Lying-In Hospital, in the outdoor service. The student who was

delivering the woman pulled on the cord and when the staff obstetrician reached the case, the uterus was lying between the thighs. The placenta was scraped off, the uterus washed with bichloride, and replaced and the woman made an uneventful recovery without fever.

In the second case the inversion occurred as the result of a slight pull on the cord, again by a student, and the woman was dead before I could reach the table from the seats.

Inversion of the uterus may occur during a manual extraction of the placenta, the fundus following the hand out.

DR. GEORGE L. BRODHEAD read a paper entitled **Dry Labor: A Study of 182 Private Cases.**

There is, and always has been, a great diversity of opinion with respect both to the course of labor in these cases and the ultimate outcome for the mother and child. In order to study a series of cases, and to consider the problem from all angles, I collected 182 cases from my private work. In this series are included patients at or near term, in whom the membranes have ruptured spontaneously prior to, or at the time of, the onset of labor, and all cases have been excluded in which the membranes were accidentally ruptured in the attempt to insert a bougie or bag for the induction of labor.

The opinion has been widely expressed that premature rupture of the membranes made one suspicious of contracted pelvis, but as a matter of fact there was no case of deformed pelvis in this series.

Malpresentation has been suspected when the membranes have ruptured early. There were 107 primiparae and 75 multiparae. The breech presented in three primiparae and in one multiparae. In three cases of twins, one child presented by the breech. In one multipara, there was a complex presentation of the head, foot and umbilical cord. Excluding the breech presentations, there was only one malpresentation in the entire series, namely, the complex presentation just mentioned. Including the seven breech presentations, the vertex presented in 96.2 per cent.

The average age in 106 primiparae was 27½ years; in 69 multiparae 30½; in 175 patients 28.7 years.

In 102 patients the membranes ruptured at the onset of labor; in 80 cases the rupture occurred before labor began. In one of the latter cases the membranes ruptured one month before the onset of labor, while the shortest period was 30 minutes, the average being 21.6 hours. Omitting the case in which one month intervened, the average was 12.7 hours.

In 16 cases in which the membranes ruptured at least 24 hours before labor the outcome was normal for both mother and baby. Of these 16 patients eight were delivered by low forceps, two by median forceps, and in six delivery was spontaneous. In one of these cases the duration of labor was 44½ hours.

Tabulated data of the duration of labor shows that the average duration of labor in primiparae was 13.42 hours,—a period apparently considerably shorter than the average for normal labor—while the average duration for multiparae was 7.42 hours, also shorter than for normal labor. The average duration of labor in eight primiparae, in whom the membranes had ruptured at least 24 hours before labor, was 16+ hours; in the multiparae the average was 7+ hours.

There were, in 107 primiparae, 20 spontaneous deliveries, 18.7 per cent; in 75 multiparae there were 56, or 74.6 per cent. The operative deliveries were as follows: In the primiparae, low forceps, 76 (71 per cent); breech extraction, 1 (1 per cent); version, 1 (1 per cent); high forceps, 1 (1 per cent); median forceps, 2 (8.4 per cent). In the multiparae, low forceps, 11 (14.6 per cent); breech ex-

traction, 1 (1.3 per cent); version, 2 (2.6 per cent); median forceps, 4 (2.6 per cent). In other words, practically 90 per cent of primiparae and multiparae were delivered spontaneously or with low forceps. The high percentage of low forceps operations in primiparae with dry labor is due, not to the dry labor, but to our efforts to shorten the duration of labor and thus spare the woman needless suffering.

There was no cesarean section in this series. Bags were used in 10 cases, in some of which at least they were not indicated, in the light of our present knowledge. There were 10 cases of persistent occipitoposterior position, which required the Scanlon rotation with forceps; eight were in primiparae, seven being low forceps cases and one a median forceps; two were in multiparae, one being a low forceps, the other a median forceps. We do not attribute persistent occipitoposterior position in any way to dry labor. There were 10 dry labors in primiparae over 35 years of age; all of the mothers and babies were in good condition.

In six primiparae and six multiparae in this series there was a loss of blood of approximately 16 oz., in nine primiparae and one multiparae the loss was about 16 to 20 oz., and in four primiparae and six multiparae from 20 to 24 oz. In two multiparae there was more profuse hemorrhage with complete recovery. There seems to be no relation between premature rupture of the membranes and blood loss.

The average weight of the babies in the case of 103 primiparae was 7.2 pounds; in multiparae the average weight of single births was 7.5 pounds.

There was no maternal mortality or morbidity in this series. In the 182 cases, where the babies were alive at the onset of labor, the fetal mortality was 1.6 per cent. In two of the three fatalities occurring in the infants of primiparae the premature rupture was apparently not responsible for the fetal death.

So far as pain is concerned it is difficult to estimate the effect of premature rupture. Theoretically, the labor should be more painful, but judging from our experience I am not able to state that patients with dry labor have more pain.

There is no specific treatment for dry labor. Pain should be relieved in every possible way with morphine, hyosine or nitrous oxide gas. Should uterine inertia be present, with incomplete dilatation of the cervix, we can aid to greater advantage by the introduction of a modified de Ribes bag than by any other method.

From experience I conclude that dry labor, in the absence of abnormal conditions, such as contracted pelvis, relatively large child, malpresentation, prolapse of the cord, etc., should be attended by no harmful results to mother or child.

DISCUSSION

DR. GEORGE W. KOSMAK.—Dr. Brodhead is to be congratulated on the results in this series of cases. The results are such that one might be led to think that it is perhaps easier for women in dry labor to go through the process of delivery than for those who have the membranes intact. To follow out this idea we would have to overcome our preconceived ideas that unruptured membranes are the thing to be maintained. From Dr. Brodhead's figures it might be concluded that it would be a good thing if we always ruptured the membranes early. This series of cases which Dr. Brodhead has described bears out our impression that premature rupture of the membranes occurs frequently. We have assumed, and textbooks bear us out in the idea, that premature rupture of the membranes spells trouble, but it seems to be contradicted in this series of 182 cases.

The cases in this series were all private patients, and being private patients we must assume that they were in good general condition and had been very carefully observed. We must also assume that they were in good health, that the musculature was well developed and they were in better condition to withstand labor than a similar series of hospital cases. That there would be a similar result in hospital

cases is questionable. I still feel that I must differ with Dr. Brodhead in regard to the general run of dry labors, because usually a woman, especially a primipara, whose membranes have ruptured when the cervix was not fully dilated, does not go through labor as easily as one whose membranes have been maintained unruptured until the cervix is fully dilated.

In dealing with dry labor I believe we are sometimes puzzled as to what course to follow when we are told that Nature must be left to her own devices. After a woman has been pounding away for 12 to 24 hours, we often wish we had done something to aid in dilating the cervix and saving the patient exhausting pain and some of the after-effects of the prolonged labor. While usually we should give a patient plenty of time to deliver herself, we ought to be ready to interfere after labor has been given a trial and there have been no definite results. I have had to be quite radical at least in one instance, in which after rupture of the membranes and draining away of the fluid it was found best to resort to cesarean section. The patient was a young woman, 19 years of age, with a long conical cervix, which after four days' labor showed absolutely no change. It seemed that introduction of the bag would be of no use, and it would take 24 to 36 hours to get results, and in the meantime the baby would be lost. So I did a cesarean and the woman left the hospital in two weeks with a live baby. Another class of cases in which the bag can be used to advantage is in multiparae who have had previous labors, probably instrumental, and where there is scar tissue which makes labor distressing. In such cases the bag helps a great deal.

So I congratulate Dr. Brodhead on his results in this well-cared-for series of cases, but whether one in a hospital service could show such favorable results I am inclined to doubt. As a rule we can follow a waiting policy, but not too prolonged. If at the end of twenty-four hours satisfactory progress is not being made, some form of interference is indicated, not only for the sake of the mother but for the sake of the child.

DR. HARRY ARANOW.—It seems to me that a paper of this sort does not lend itself to discussion. Dr. Brodhead presents a set of carefully prepared facts and we cannot argue, but we can try to make a few deductions. One fact conveyed to me as a student was that rupture of the membranes was a serious complication of labor. When it occurred it thoroughly frightened me, and I felt that I should attempt to interfere, but as time goes on I find that I interfere less than previously. I am tempted to interfere where the water has pretty well drained away and the cervix is short and thick. Just recently I had a case of this character in a woman with a just minor pelvis and the water had drained away at the onset of labor. I felt that if left alone labor would continue for days, so I inserted the bag and a practically normal delivery followed. Evidently Dr. Brodhead does not think that any special treatment is necessary except to care for the obstetric condition that is there. Dr. Brodhead must have come across some of the very serious cases one sees in consultation, those that have been in labor for days and have to be helped out.

Another point that must be considered is the danger of infection. In prolonged labor after rupture of the membranes microbes enter the amniotic sac and even reach the placenta. Then again, we must remember that these cases were handled by Dr. Brodhead himself. I am opposed to the use of the bag in the late stages of labor when the head is well down, as it may get one into trouble. It is better to pack the vagina with cotton or gauze against the cervix and against the baby's head. Dr. Brodhead brought out the fact that he does not think that dry labor causes occipitoposterior presentation. How often does occipitoposterior cause rupture of the membranes? I am under the impression that with an occipitoposterior

in the early part of labor there is more likely to be a dry labor than with a normal position.

DR. SAMUEL J. DRUSKIN.—I would like to ask Dr. Brodhead what he means by premature rupture of the membranes. In the later days of pregnancy there may be a separation of the membranes from the lower uterine segment and there may be a pin-point opening high up in the membranes. Is that a premature rupture of the membranes? We see these cases quite often and the results are almost as good as in cases in which the membranes have not ruptured. Now, in every line of endeavor there are some bugbears, and in obstetrics we have mainly two, namely, occipitoposterior positions and premature rupture of the membranes. Some time ago I expressed my opinion about occipitoposterior presentations. At that time, I said, a condition that occurs once out of three times is not abnormal, as is the case in occipitoposterior position. Nevertheless, in a certain number of these cases great difficulties will occur. The same may be said of premature rupture of the membranes. As a rule, labor is not interfered with very much, but sometimes progress is very slow and we may encounter a great deal of trouble as a result of it. I have now a case in the hospital in which the membranes ruptured four days before the woman was delivered. She had several sleepless nights. I intended to put a bag into the cervix, but was influenced not to do so by the wish of the patient. After four days the pulse rose to 120, temperature 100°, and respiration 46. The head was in the pelvis, but the cervix was dilated only three fingers. I did a vaginal cesarean section and extracted the fetus with forceps. The woman did not lose a great deal of blood; yet she went into shock. She responded to the usual treatment; nevertheless, the next day, she was seriously ill with marked distention of the abdomen. This condition was relieved, but the following day she had the same complaint and her illness took a very unfavorable course. She was given a blood transfusion and ran a temperature of 103.5° for two days. Then the temperature came down and the rest of her convalescence ran a normal course. This is what sometimes happens when one does not interfere early; it is not well to wait too long. Often with a small dose (2 or 3 minims) of pituitrin we can start labor pains. When this fails the introduction of a bag to dilate the cervix is effective as Dr. Kosmak has already said.

In conclusion, I wish to say, though early rupture of the membranes is not necessarily a serious condition, it is, nevertheless, a condition that should not be left too long untreated.

A VISITOR.—I should like to ask Dr. Brodhead how he determines what dry labor is and how he classifies these cases. We have cases in which there is a great deal of fluid, and again others in which there is almost no fluid, and we have cases with all degrees of fluid. When the membranes rupture before the onset of labor, is it hard to tell how much fluid has been lost? We have to take the patient's word for it and that is very unreliable. In those cases in which the membranes have ruptured before the physician was called, it is difficult to tell whether the case is one of dry labor or of normal labor. It would be interesting to know what the effect of instrumentation was in the 135 cases delivered by forceps, and whether this method of delivery was in any way detrimental to the children.

DR. SAMUEL J. SCADRON.—Dr. Brodhead's excellent results in his cases of dry labor are no doubt due to his uniformity of treatment. If I understood him correctly he had about seventy-one per cent of low forceps cases in his series of private practice.

To my mind the shortening of the second stage of labor is a great factor toward lowering of the fetal mortality and also the unnecessary suffering of the mother.

I think that an equally good result may be obtained in hospital services, especially with reference to the fetal mortality, if the internes were permitted to shorten the second stage.

DR. HERVEY WILLIAMSON.—From my teaching experience I think that we should teach that when a large amount of fluid drains away it frequently means a difficult labor. I do not believe that part of our teaching should be changed.

DR. FREDERICK W. RICE.—I must agree with the last speaker in regard to the necessity of making a distinction between what is meant by dry labor and premature rupture of the membranes. In most cases, especially primiparae, when the membranes rupture early in labor we have to care for a labor that is not normal duration of labor. The prognosis in cases where the membranes rupture early, it interferes with the normal dilatation of the cervix. As a result, labor is unduly prolonged. In a vertex presentation where there is early rupture of the membranes, we have to deal in most cases with the posterior position of the occiput.

Some time ago, I had the occasion to go over the records of many thousands of cases and made special note of the duration of labor in cases where the membranes had prematurely ruptured. The results show distinctly an undue lengthening of the normal duration of labor. The prognosis in cases where the membranes rupture prematurely cannot be as good for the mother or baby owing to the prolonged labor. In cases where the fluid has drained entirely away, the prognosis is much more serious for both mother and baby. These cases are rare and there is always some definite reason why the presenting part does not act as a ball valve, and prevent the escape of the fluid from the uterus.

In the last week, we have had three such cases of dry labor at Bellevue Hospital. In one of these cases, the patient had a contracted pelvis and was in labor six hours before being admitted to the hospital. On admittance a cesarean section was immediately performed, but in that short time, a tonic uterus had developed. In the second case, an arm had prolapsed into the pelvis because of the presence of a cyst, which prevented the head's engaging. A tonic uterus developed before the cervix was fully dilated, necessitating interference. A third case was a breech with similar results.

A premature rupture of the membranes in vertex presentations occurs in nearly fifty per cent of the cases and in almost all of these cases there is a posterior position. If the occiput is not well anterior, the presenting part does not fit well into the lower uterine segment, and as a result the pressure on the fluid about the child during a contraction is transmitted directly to the forewaters, resulting in rupture. It is only in an anterior position that the head acts as a ball valve, completely shutting off communication between the forewaters and the fluid about the child, thus diminishing the pressure on the bag of waters during a contraction.

DR. CALDWELL.—When membranes rupture, either before labor has started or at the onset of labor, I believe a very careful examination should be made, and if there is any displacement of the presenting part, such as an extended head or a parietal presentation or a breech with extended legs, every effort should be made, by manipulation, to correct this position as far as possible, and fill the lower uterine segment with the descending part to take the place of the ruptured membrane. Occasionally, when this cannot be done, especially in breech presentations, and the lower uterine segment is lying loose with nothing in it, I believe the insertion of the bag is indicated.

In the majority of cases with a rupture of the membrane I agree with Dr. Broadhead that they will come through normally. I do not believe in the routine use of bags in such cases, or displacing the presenting part by the insertion of the

bag. I am always irritated to hear talk of waiting twelve to twenty-four hours before doing anything. I think the labor should be planned as early as possible when the membranes have ruptured.

DR. BRODHEAD, (closing).—Dr. Kosmak asks, since the results have been so satisfactory in these cases, why not rupture the membranes in all cases? Because, in some cases, there might be a loop of cord presenting, or we may have a face presentation, a breech or an occipitoposterior; I am not teaching that this is the thing to be done, but am simply giving my experience with cases in which this accident has happened. Dr. Kosmak is correct in assuming that the results in private work are better than they would have been in a series of hospital cases. We should get better results in private practice than we can in hospital work. It must also be borne in mind that some of the hardest labors we see are in cases in which the membranes have not ruptured prematurely, and rupture of the membranes is not the only cause of uterine inertia. We agree that in every case, whether a dry or normal one, when there are indications for interference we should act upon such indications. We have all seen cases in which the patient and the baby were apparently all right, but when the membranes ruptured, the fetal heart was slow or irregular and the baby was already asphyxiated, and yet the membranes had not ruptured early. If I had had the case in which Dr. Kosmak did the cesarean section after having waited four days, I would have used a bag and waited one day longer, if necessary, as that would probably have made no difference in the outcome, and the woman would have a better prognosis for future childbearing than she now has.

Dr. Brodhead asked Dr. Kosmak if his patient had run a temperature and if her convalescence had been normal.

DR. KOSMAK.—The woman had a normal convalescence and made a good recovery.

DR. BRODHEAD.—Regarding Dr. Aranow's discussion, there are a certain number of patients who get into such a mental state that something must be done, or if the patient does not demand that something be done, her parents insist that we do something. It may be better after several days to introduce the bag for the sake of the family rather than for the patient. As to the cases seen in consultation, I cannot see why such cases should be any worse than those that we meet in our own work. If the patient has prolonged uterine inertia or a contracted pelvis she must be cared for according to the indications. I do not claim any greater experience or superior skill than is possessed by others, but I plead for noninterference, and I have endeavored to demonstrate the advantages of noninterference. I cannot tell what percentage of cases had occipitoposterior presentations, but there were only 10 such presentations that required treatment.

A number of men have asked what I mean by dry labor. I am well aware that a certain amount of fluid can come from the sac between the amnion and chorion, and yet a great loss of fluid does not occur. Taking the cases as they come, whether the membranes ruptured early or near the onset of labor, it is difficult to say just how much fluid was lost and how much remained, because the amount of fluid present varies so greatly in different cases. Some patients may lose a pint, and have lost practically all the fluid, while others may lose this amount and still have two or three pints remaining in the uterus.

One of the speakers referred to the 71 per cent of low forceps operations. The majority of these low forceps operations were done with the head on the perineum with the caput in sight.

Dr. Williams' points were well taken. It is important to try and make the

diagnosis of contracted pelvis long before labor begins; everything ought to be done to estimate correctly the size of the pelvis and that of the baby.

I am unable to take up the question of the relative length of the labors in multiparas and primiparas in the occipitoposterior cases. In this series there may have been 40 to 50 per cent in the 182 cases, but there were only 10 of these where the occipitoposterior position demanded treatment. It makes little difference whether the presentation is L. O. A. or O. P., as most of these cases rotated from the O. P. position to O. A.

Someone asked if at seven and one-half months there was premature rupture of the membranes, what I would do. I would simply wait, as occasionally one of these cases may go to term.

As to the percentage of lacerations in the series I have no idea how they compared with those in normal cases. I see no reason why one should have more lacerations in dry labor than in any other kind of labor.

I agree with Dr. Caldwell that if there are malpositions they should be corrected and that the pelvis should be carefully measured, but I do not believe in putting in a bag because the membranes have been ruptured for 24 or 48 hours or for any fixed length of time. In another series, I would probably use the bag less than I did in this one. There is too much interference (I am not referring to Dr. Caldwell) in what should be considered a normal, natural process. I may have had rare good luck, but these are the figures as they were taken in the series from private work.

NEW YORK OBSTETRICAL SOCIETY

MEETING OF NOVEMBER 13, 1923

THE PRESIDENT, DR. FRANKLIN A. DORMAN, IN THE CHAIR

DR. ROBERT L. DICKINSON presented a report of **A Case of Obstinate Diabetic Eczema of Vulva, Rapid Cure by Insulin Administration, with Return of Menstruation at Fifty**

This patient, first seen at the age of twenty-two, had one child and one miscarriage, was of a fine type, working hard, cultured, self-controlled. For ten years there was occasion for watching her urine, owing to attacks of irritable bladder that were found to be directly due to a marked endotrachelitis, a relapse coming about once in two years. Treatment has, at times, shrunk this cervix to one-half its previous diameter. The trouble only ceased recurring when the cautery tip was employed. From this frequent analysis, we know that there was no early glycosuria. When she was thirty-two sugar appeared and she was placed under the Allen treatment, with sugar-free gaps of three months at a time. One of the courses of mental healing did great things for her, and she carried her recurrent diabetes in a very unusual fashion for some seventeen years. Then, at forty-nine, vulvar irritation gradually developed and went on to a wide eczema, as large as half her palm on each side, with a raw area also below the mons. The torment was extreme. Even with diet regulated, cervix sound, leucorrhoea absent, bowels regulated and self-control strong, the pruritus grew steadily worse, and was little helped by one of our best dermatologists.

At this point she entered the Presbyterian Hospital as one of Dr. Geyelin's early patients. The preliminary starvation produced a little betterment in the eczema,

but from the very first dose of insulin a phenomenal change took place—swift drying, scabbing, skin-cover, disappearance of itching. In two days progress occurred which we would call good if developed in two weeks. In seven months no return has occurred.

The menopause began at forty-five and was practically complete at forty-seven, yet at fifty, after seven months of insulin and a gain in weight of twenty pounds, the periods have returned fully and regularly during the last four months.

The Report of the Committee on the Regulation of Conception was presented by the Chairman, DR. HAROLD BAILEY, and included a summary of the answers to the questionnaire previously submitted to the members of the Society. (For original article see page 266.)

DISCUSSION

DR. ROBERT L. DICKINSON.—The Society should also be informed of the progress made on the study of the subject outside of its own committee's activity.

The general plan of the Committee on Maternal Health of New York, a voluntary organization of representative lay and medical persons, took shape on March 9, 1923 (after nearly a year of discussion with prominent members of the profession) and I was made chairman of the medical group. Typewritten copies of the program of this organization were submitted to the New York Obstetrical Society, for advice and cooperation. At this March meeting of the society a motion was made that a committee be appointed to consider the problem. Before this committee of the Society, the Committee on Maternal Health spread its proposed program and policies and procedure for criticism, and also attempted to discover whether, in the opinion of the committee, the New York Obstetrical Society should take over the clinical investigation of contraception which the Committee on Maternal Health has laid out. Four out of five of the members of your committee expressed the belief that the society was not equipped to undertake this work nor was the opening of an office and the executive labor involved a proper function for the Society. The Committee on Maternal Health held up active work in the hope that at the May meeting of the Obstetrical Society a decision could be reached, but the Society merely instructed its committee to go on with the questionnaire. Thereupon the Committee on Maternal Health began to take active steps towards securing contraceptive advice for patients legally entitled to such advice, and got into communication with a carefully selected list of clinics. In general it was found that the larger institutions could take care of their own contraceptive work, having gynecologists and obstetricians on their staff. As long as good clinical reports could be obtained from these self-contained sources the Committee on Maternal Health was satisfied. This will explain why few cases have been directly referred to gynecologic clinics.

In order to work out practical details for out-patient departments two meetings have been held between the medical members of the executive committee of the Committee on Maternal Health and the chiefs of clinics. Invitations were extended to Brooklyn Hospital, Long Island College Hospital, Mt. Sinai Hospital, N. Y. Infirmary for Women, Post Graduate Hospital, Sloane Hospital and Woman's Hospital. At these meetings it developed that the dispensaries would furnish contraceptive measures at cost; that a single source of supply which could be controlled was desired; that printed instructions were essential; that these instructions should be numbered in pads, should bear the imprint of the Committee on Maternal Health in order to show who was responsible for them, and that each should carry the name of the patient to whom prescription was given, and the signature of the

doctor prescribing. Of the three methods selected for clinical investigation two were to be started at once,—namely, the sheath and the acidulated jelly,—the cervix cups not being available. Since then certain clinics have had supplies furnished them.

The Committee on Maternal Health arranged for a study of the literature, made chiefly by Dr. Edward Preble. I have verified a large number of the abstracts and been in communication with the clinics in Europe. A member of the Committee has visited Dutch and English clinics. This considerable mass of material is now in process of condensation. It covers, be it clearly understood, the clinical, technical, professional aspects only, such as indications and contraindications, technique, efficacy, harmfulness, or harmlessness of procedures, and has nothing to do with the sociology, propaganda or nonprofessional aspects of the question.

The Committee on Maternal Health has an office, a graduate nurse as manager, and a secretary-stenographer. The Executive Committee has been faithful in its attendance of meetings and in work carried on straight through the summer. The majority of this committee is made up of medical men, to wit; an internist, a public health teacher, a gynecologist, a urologist, and the medical head of a social welfare organization. The medical members will be nominated for the executive committee by the medical group. A majority on this medical group should be members of the New York Obstetrical Society. With such majority representation in the body that decides the policies and procedures of the Committee on Maternal Health and with a special committee advising the Committee on Maternal Health this Society of ours might well feel that it could control the work of the Committee on Maternal Health. This work has been developed cautiously and along strictly clinical lines, as an attempt to investigate the gynecologic-obstetric subject which has never received the benefit of any real investigation as far as the literature and our correspondence can determine.

The Committee on Maternal Health invites members of the New York Obstetrical Society who would be interested in the work of the Committee on Maternal Health to join its medical group. This involves no financial obligation or signature to any set policy or belief, but it does involve a desire to take part in an honest and open minded study of contraception, and later of other problems bearing on fertility and sterility. We have for the present the funds necessary to carry on our investigation, and we have no purpose of letting ourselves become entangled with any propaganda or legal question. We shall strictly avoid publicity.

The object of this Committee, organized March 9th, 1923, is to conduct a study:

(a) To determine what may be practicable and scientific in dealing with problems in the field of fertility and sterility, beginning with the problem of therapeutic prevention of conception.

(b) To collect and examine case records in relation to the questions under consideration, and so to obtain data on the practical aspects of these subjects.

(c) To maintain an office of record and reference, but not for treatment or professional advice.

Program.—For administrative reasons the work of the Committee is divided into two major parts; (1) that dealing with problems of sterility; (2) that dealing with problems of fertility. Until plans are more fully developed the first part of the work is confined to the bringing together of data from the literature on sterility, the study of clinical records available to the Committee, and the collection of personal opinions of experienced members of the profession. Similarly in dealing with the second part of the work, the Committee will confine itself largely for the present to a study of methods of voluntary contraception.

OUTLINE OF PROCEDURE FOR THE STUDY RELATING TO CONTRACEPTION.

(a) To accept for this special study only patients coming under the provisions of the New York State Law which permits a physician to prescribe contraceptives to cure or prevent disease.

(b) Such patients to be accepted must be referred with the diagnosis over the signature of one or more physicians of recognized standing as determined by the Executive Committee for the purpose of this study. Each physician referring such a patient will furnish a statement regarding the condition for which contraceptive advice or treatment is necessitated for the maintenance or protection of the patient's health or the saving of life.

(c) Such patients together with the case record containing the diagnosis shall be referred to a clinic of recognized standing whose staff will be responsible for administering appropriate therapeutic treatment for the prevention of conception. Such clinic will be either within the institution where the diagnosis and need for care arises, or, if necessary, in some other clinic.

(d) This Committee keeps accurate case records of all patients referred to it from, or referred by it to the clinic staffs cooperating in the study; and it will undertake follow-up work wherever such follow-up is required, for the purpose of ascertaining the extent to which advice or treatment is understood and followed; and later for ascertaining the results of the contraceptive measures employed.

(e) These case records and follow-up data will be made the basis of reports which will be released by the Executive Committee to the medical profession only through the recognized medical channels, (i. e., before medical societies and in medical publications) after approval by the medical group.

The need for this work was determined by conference among individuals familiar with the programs of national medical and public health organizations. A number of prominent men and women interested in public welfare were interviewed. The net result was that no existing organizations were found whose activities could readily be arranged to include at this time the promotion of this project, either because their directors were unwilling to undertake the work or believed the fundamental scientific facts were not yet available on which they were willing to act. The view was generally expressed, however, that something ought to be done,—something tangible in the way of proving what is practicable, needed and in full accord with the best interests of society and of family life.

This organization has no plans at present for alliance or affiliation with any other existing organization. Being a strictly medical and public health project, and its medical policies being outlined and controlled by physicians of recognized standing, it will strictly avoid general publicity.

Organization.—The Executive Committee is composed of the Chairmen of the following groups, and three physicians at large:

- (1) A medical group to pass on all medical policies, personnel and procedures.
- (2) A legal group to pass on legal matters and the legality of all proposed actions.
- (3) A group of lay members responsible for financing the budget and accounting for expenditures.
- (4) A group of public health and practicing nurses to pass on nursing and follow-up service matters.
- (5) A group of social workers to advise and cooperate in all phases of the study related to social work.
- (6) A group of individuals especially informed regarding the views, policies and activities of national agencies and other organizations interested in the work of this Committee.

This Executive Committee of nine is responsible to the entire body of members for the carrying out of this study, appoints the office executive and other members of the staff, and governs all the activities and expenditures of the organization. This Committee has power to enlarge its membership by adding the chairmen of any new groups which may be desirable and conversely to reduce its number as experience may determine, it being provided, however, that there shall always be a majority of medical members on the Executive Committee.

The summary of the literature, which I propose to bring up later, shows a total of thirty-four acceptable clinical cases or studies of contraceptive measures, whether efficacious or not and whether harmless or not, in this huge mass of literature which Dr. Kosmak spoke of at the last meeting. I do not know what would show the need of a clinical study better than that. There is no general consensus of opinion.

There is a surprising amount of ignorance in this country concerning what Holland has been doing for over twenty years with the soft rubber vaginal cup. It is legal for doctors and nurses to prescribe in Holland. England has had two clinics in operation for two years and it will furnish us with statistical evidence. Both recommend the cervix cup. The Stopes clinic uses the snug fitting cervix cup, the other, or Haires clinic used the cervix cup of the Dutch and German form which distends the fornix to the limit. Our representative has only just returned after visiting these clinics. Neither the Dutch nor the English clinics have the money to carry out an adequate follow-up system and they would welcome a scientific study, including a follow-up.

DR. BYRON H. GOFF presented **An Analysis of Wound Union in 3,000 Abdominal Incisions From the Clinic of the Woman's Hospital.** The complete article will appear in the Transactions of the American College of Surgeons as part of the Standardization Program. The following is an abstract of the essential features and results of this study.

The abdominal incision is a surgical procedure upon which the vast majority of surgeons are in accord, both as to the methods of making and the methods of closing the wound. The incisions of both upper and lower abdomen have become classical, while the simple method of closing the abdominal wall in layers by means of an absorbable suture material, reenforced by removable tension sutures of a non-absorbable material, has been widely accepted as the method of choice. It may be said, therefore, that the methods employed at the present time, both in the making and in the closing of the abdominal incision, have been standardized.

In view of the fact that there is such widespread satisfaction with the standard technic employed in this procedure it is natural to assume that its acceptance has been based upon a sound knowledge of the supposedly superior results which follow its application. A perusal of the rather extensive literature on the subject promptly convinces one of the fallacy of any such assumption, for in no instance has a writer offered convincing proof, in the form of a result study, of its superiority over less widely practiced methods.

Bearing in mind, therefore, that the methods, which are now standard, have been accepted largely on theory, it might, perhaps, be of interest to subject these methods to at least a study of immediate results with the following objects in view:

1. To establish a classification of wound union in such incisions.
2. To learn the actual incidence of faulty union in abdominal incisions.

3. To determine the maximum allowable incidence of faulty union in abdominal incisions.

4. To compare the immediate results following the different methods employed, especially in the closure of the wound.

Conditions at the Woman's Hospital have been remarkably favorable for such a study, since all of the members of both attending and junior attending staffs operate under practically identical conditions upon very similar classes of cases. Each member of the staff enjoys the same operating facilities, the advantages of carefully given anesthetics by a staff of professional anesthetists and competent assistance by a well organized house staff. The preoperative preparation, which consists of a careful cleansing of the shaved abdomen with soap, ether and alcohol, followed by a double application of tincture of iodine, is the same in all cases, while the wound in every case is thoroughly protected by an appropriate gauze or towel protection. The postoperative care of the abdominal wound is practically the same for each member of the staff. All materials which come in contact with the field of operation are subjected to weekly bacteriologic examinations. Finally, there has been in operation for the past four and a half years a definite method of recording wound union in abdominal incisions. Obviously, under such conditions, comparisons can be fairly made. Before entering upon a study of wound union in abdominal incisions it was essential that they be classified according to the conditions present at the time of operation. All abdominal incisions included in this review have, therefore, been divided into two classes as follows: (1) Wounds clean at the time of operation; (2) Wounds contaminated at the time of operation.

The following classification of wound union, which takes into consideration not only infection as a cause of faulty wound union, but all other causes as well, has been developed and adopted as the standard classification for the Woman's Hospital:

Class A.—Wounds Which Unite by Primary Union. Any break in the union of a wound excludes it from *Class A*. Any discharge of blood, serum or fatty material which occurs after the tenth day excludes a wound from *Class A*.

Class B.—Wounds Which Do Not Unite by Primary Union Because of Minor Defects such as: slight infection; slight degree of fat necrosis; small hematoma; slight stitch hole infection which involves the line of union of the wound; collection of serum discharged after the tenth day; slight separation of the tissues; slight degree of pressure necrosis, cigarette or tube drain following the removal of which the wound heals promptly by granulation without infection; cigarette or tube drain plus slight infection about the drainage tract; foreign body (unabsorbed suture material etc.), following the removal of which the wound heals promptly by granulation with or without slight infection.

No case which has been detained in the hospital one or more days because of the condition of the wound is to be placed in *Class B*.

Class C.—Wounds Which Do Not Unite By Primary Union Because of Major Defects such as: extensive infection; marked degree of fat necrosis; large hematoma; extensive stitch hole infection which involves the line of union of the wound; wide separation of the tissues, with or without partial evisceration, which results in prolonged healing by granulation with or without infection; marked degree of pressure necrosis; cigarette or tube drain, following the removal of which the drainage tract heals by prolonged granulation without infection; cigarette or tube drain plus extensive infection about the drainage tract; foreign body (unabsorbed suture material etc.), causing a sinus along which there is prolonged granulation or infection; intestineabdominal or vesiceabdominal fistula.

All cases which have been detained in the hospital one or more days because of the condition of the wound are to be placed in *Class C*. Small rubber tissue or silk-worm gut drains placed in fat of the abdominal wall are not to be considered causes of faulty union.

The present analysis covers 3000 abdominal incisions made and closed by nine members of the attending and junior attending staffs of the Woman's Hospital. Of these 2755 incisions have been classified as clean, while 245 incisions have been classified as contaminated at the time of operation. The procedures performed through these incisions have been largely gynecologic with an occasional operation on the appendix or gall-bladder, or for some type of hernia. Mammary and kidney incisions have been excluded. The vast majority of incisions have been longitudinal median ones, the remainder have been transverse suprapubic, right rectus, McBurney or inguinal. With the exception of a very small number of cases, all of the incisions have been of the intermuscular type.

Two widely different methods of wound closure have been employed. In one the abdominal wall has been closed in layers by catgut sutures, reenforced by removable tension sutures of silk or silkworm gut; in the other the closure has been accomplished by means of removable silk sutures in all layers excepting the peritoneum. The former method is one with which all surgeons are familiar, while the latter method is unique.

In detail the method is as follows: The peritoneum, transversalis fascia and posterior sheath of the rectus muscle are closed by a continuous suture of plain catgut. The rectus muscle is not sutured. The anterior sheath of the rectus muscle is closed by a continuous mattress suture of prepared silk, both ends of which are carried through the fatty layer and skin to the surface on one side of the incision at the angles of the wound (suture 1).

The deep layer of the superficial fascia of the abdominal wall is closed by a continuous mattress suture of prepared silk, the ends of which are passed through the fatty tissue and skin to the surface 1 cm. beyond and in the line of the wound (suture 2).

The skin is closed by a subcuticular continuous suture of prepared silk, the ends of which are passed through the skin to the surface on the side of the wound opposite that upon which the deepest suture emerged (suture 3).

When tightening the sutures it is important not to pull them backward and forward after they have been placed, but to allow them to remain stationary, as there is a certain cohesion between tissues and suture material which assures an ideal approximation until union is complete.

In tying the sutures, suture No. 1 is tied by a bow-knot to suture No. 3 over a gauze bolster at the lower angle of the wound. The other ends of the same sutures are tied together in a similar manner at the upper angle of the incision. The ends of suture No. 2 should be at least two inches each in length and should not be tied.

On the tenth postoperative day the bow-knot at the lower angle of the incision is untied and the bolster removed. A small amount of tincture of iodine is allowed to run into the suture tracts, the sutures are iodinated near the skin and then cut beneath the surface of the skin. At this time the upper ends of the sutures are not disturbed nor is there any attempt to remove any of them. On the twelfth day the upper bow-knot is untied and a gentle attempt made to withdraw all three sutures, the skin suture (No. 3) first, the suture in the deep layer of the superficial fascia (No. 2) next, and finally the suture in the anterior sheath of the rectus (No. 1).

TABLE I
INCIDENCE OF INFECTION IN 2755 CLEAN ABDOMINAL INCISIONS

	EXTENSIVE INFECTIONS	SLIGHT INFECTIONS
	CLASS C.	CLASS B.
1645 Incisions Closed by Absorbable Sutures	4.7%	5.3%
1110 Incisions Closed by Nonabsorbable Sutures	2.1%	1.9%

TABLE II
INCIDENCE OF INFECTION IN 245 CONTAMINATED ABDOMINAL INCISIONS

	EXTENSIVE INFECTIONS	SLIGHT INFECTIONS	DRAINAGE EXTENSIVE INFECTION	DRAINAGE SLIGHT INFECTION
	CLASS C.	CLASS B.	CLASS C.	CLASS B.
158 Incisions Closed by Absorbable Sutures	8.9%	4.4%	19.6%	8.2%
87 Incisions Closed by Nonabsorbable Sutures	9.1%	3.4%	17.2%	8.0%

If the removal of any of the sutures is found to be difficult, a small artery clamp is placed on the ends to prevent retraction beneath the skin and wrapped in the dressing until a second attempt is made the following day. The second or third attempt results in easy removal, if the sutures have been properly placed at the time of closure.

There is but a single objection to the method, and that not a serious one, namely, difficult removal if the suture has not been properly placed. If perchance a part of a suture should be left permanently in the tissues through breakage at the time of removal no harm has been done. In this connection it is important to bear in mind the fact that surgeons of wide experience bury silk sutures in the sheath of the rectus with no intention of removing them. In no case in the series studied has it been necessary to reopen the wound for the removal of a suture broken in removal.

Of the 2755 incisions classified as clean, 1645 have been closed by the conventional catgut method, while 1110 have been closed by the removable silk suture method. Of the 245 incisions classified as contaminated at the time of operation, 158 were closed by catgut and 87 closed by removable silk sutures.

DISCUSSION

DR. GEORGE G. WARD.—I am proud of the fact that the Woman's Hospital has been able to present such an example of the value of an end-result study. We are studying our end-results in our work in the more thorough way that has been advocated by Dr. Codman, of Boston. It is due to Dr. Codman's teachings that the surgical conscience has been awakened. I hold that we should audit our surgical results just as our financial books are audited.

I think this work of Dr. Goff's deserves a great deal of credit. It was a long, tedious task. The value of this work, or of any study that is made of operative results is entirely dependent upon carefully taken histories and accurate records. If you have no accurate records you cannot make deductions of value from what you

have recorded. That, I think, we owe largely to the movement of hospital standardization inaugurated by the College of Surgeons.

DR. HERMANN GRAD.—I am a firm believer in wound closure with non-absorbable material and I have used it for a good many years. In the statistics Dr. Goff showed that my incidence of infection with catgut closure was 8 per cent, and then with nonabsorbable material it dropped to 5 per cent. Then he mentioned the fact that I broke some of the stitches and I had some legal trouble with it and I changed and went back, not to catgut closure entirely, but to silkworm gut and catgut in the skin. As a matter of fact I had silkworm gut closure, except that I used catgut in the peritoneum and the skin, and immediately my percentage rose to exactly what it was when I used catgut alone. In other words, that little piece of catgut that I put in the skin gave me a 3 per cent higher incidence. It shows very conclusively that catgut is at the bottom of it.

There is one thing that I cannot agree with, and that is the classification of the wounds. Dr. Goff says that whenever a drain is used he considers it a contaminated wound. I know that with drainage one can have primary union in infected, contaminated wounds just as one can have in clean wounds. I think there should be a third classification in those cases. For instance, if you take out an appendix and leave a drain, the wound heals by primary union down to the drainage tract. I consider that primary union in spite of the fact that there was a drain used. Dr. Goff considers two classes only, the clean and the contaminated wounds.

DR. GEORGE W. KOSMAK.—I feel that this expression of unrestrained approval for the nonabsorbable suture should not go on record without a word of objection. It seems to me that there are other factors which enter into successful wound closure aside from the suture material that is used, and I believe that one of these, to which not sufficient importance is attached, is trauma. If a surgeon gets out of the habit of using metal retractors except where definitely needed, and gets out of the habit of handling the wound edges roughly, he will get very much better results than the man who insists on keeping the wound edges spread far apart with a hard unyielding metal retractor.

Another point that should enter into the discussion, is the site of the wound. I personally have found much better wound closures to have followed the use of the transverse suprapubic incision and I use it whenever possible. I find that the wounds heal most kindly, and with a great deal less disturbance than with the more or less vertical incisions.

I do not believe that we ought to condemn entirely catgut closure. I for one, basing my remarks, of course, on personal experience only, feel that it is just as safe, if not safer, than the form of closure which requires the subsequent removal of sutures.

In my own work, as I say, I use the transverse incision whenever possible, going through skin and fascia, and then making a vertical incision through the peritoneum. That criss-cross incision seals the abdominal wound and it does not really make very much difference what form of material you use to bring the edges together. Remember, also, that primary wound closure does not depend entirely on the suture material, but it depends on the accurate apposition of the layers and simply keeps them in place long enough for Nature to complete the union. It seems to me that catgut, used in the smallest possible size, does that very effectually, and as far as the skin is concerned, you can do as well with the ordinary Michel clips if you are in a hurry, or sterilized adhesive straps, as you can with a needle and thread. So that I personally feel that we ought not to go on record here as entirely condemning the absorbable method of wound closure, because I am sure that I echo

the sentiments of others when I state that it can be successfully used, and that the failure in many of these cases is not due to the material that is used for the closure, but rather to the trauma which the wound edges have sustained during the process of operation.

DR. R. M. RAWLS.—As one of the operators whose end-results were reported, I would add that formerly a certain amount of infection was not only expected but did occur, but since adopting nonabsorbable sutures infection even in contaminated cases is unusual. Formerly I considered the technic of closure of the abdominal wound as one of the most important steps in the operation, but with this method the interne gets equally as good end-results.

I was a little loath to adopt this procedure, but by its use my incidence of infection decreased surprisingly. This was not due to any other change in technic for I am just as traumatic now as formerly. Furthermore, it is just as applicable to the transverse incision as to the median, and to prevent infection in the former is most desirable, for with the absorbable sutures some of my most severe infections occurred in the transverse incisions.

I agree with Dr. Goff in his classification of wounds for I cannot conceive of a drained wound healing by primary union. It is true that there may not be any appreciable infection from the drain, but the wound heals in part by granulation and therefore should not be classified as primary union.

DR. HERMANN GRAD.—May I just call attention to one point? If one palpates a healed abdominal wound which has been closed with nonabsorbable material and one which has been closed with catgut, one appreciates a great difference. A wound that is closed with catgut is indurated and hard, and not as yielding to the touch as one which is closed with nonabsorbable material. Around each catgut knot there is a certain collection of leucocyte and that makes the wound hard and unyielding.

DR. HIRAM N. VINEBERG.—In order to make this study of greater value to us it would have to be continued and the end-results noted two or three years hence from the standpoint of the incidence of hernia. I have my doubts whether with a wound closed in this manner, where the line of union is soft, the union is going to remain as firm as one with a firm, hard ridge through it. With the latter I am confident there is not going to be a hernia.

DR. LEROY BROUN.—I think the answer to Dr. Kosmak's point and also to that of Dr. Vineberg's is this. The same surgeons (eight of them) who were using absorbable sutures transfer to nonabsorbable sutures and their primary unions increase at once, or their infected wounds decrease at once, at least one-half of what they were before. The same amount of trauma of which Dr. Kosmak speaks existed with the same surgeons. Therefore, there is only one translation to it and that is the mere use of absorbable sutures.

Now, from the standpoint of the follow-up: When patients come back to the follow-up clinic we recognize whether their wounds are firm or not. In no instance, as far as my memory serves me, have I seen a single one of the wounds brought together by this "three-stitch-closure method" showing a separation of the fascia. My personal experience was that in using buried sutures, a certain percentage of infected wounds resulted. It was unsatisfactory. It was with considerable hesitation, because I did not like the idea of having to take out sutures at the end of twelve days, that I adopted the nonabsorbable suture. After doing so, however, the percentage of infections dropped in marked degree and gave me more satisfactory end-results. I think where we can apply this suture to wounds, it is by

all odds the suture, or wound closure, that gives us the best promise of perfect wound healing.

DR. DOUGAL BISSELL.—Experience has convinced me that the method of closure described by Dr. Goff this evening has many advantages over the methods I have previously used.

Theoretically I have always accepted the principle that the less Nature had to contend with in the peritoneal cavity, or in the abdominal wound, the less disturbing would be the patient's convalescence. I always applied this principle to my intraabdominal work and therefore used only plain catgut of the smallest sizes, when my colleagues were using large plain gut, chromic gut and silk. One of my colleagues, Dr. Charles G. Childs, carried this principle to its logical conclusion, and sometime before 1913 insisted upon the use of removable sutures on closing the abdominal wound. I would have adopted his suggestion sooner but, having had several disturbing mishaps from imperfect silkworm gut used in suspending the kidney, I hesitated to apply the removable suture in any form, when the resistance to removal (as in the abdominal wound) was greater than when encircling the kidney for its suspension and fixation. However, after substituting the B & B prepared silk for silkworm gut and finding that it could be depended upon and easily removed, I adopted its use in closing all abdominal wounds.

I feel personally indebted to Dr. Childs for bringing this principle to the attention of the profession, and it may be of interest to you to know that in a paper published by him in 1913, his statistics show even better results with removable sutures than we are now getting.

His comparative study of wound closure is as follows: plain catgut, primary union, 78 per cent; linen thread or silk, presumably buried, 80 per cent; removable silkworm gut, 96 per cent; silver wire 100 per cent. May it not be desirable to follow him further and use silver wire, instead of the prepared silk which was used in the series of cases of removable sutures presented by Dr. Goff? Silver wire was the only reliable suture in the days before aseptic and antiseptic surgery. It is a protecting material as its contact with the tissues forms an albuminate of silver.

DR. GOFF, (closing).—In regard to Dr. Vineberg's remarks concerning the likelihood of postoperative hernia following the removable silk suture method of closure, I must admit that we do not know what the incidence of that complication is, since we have not had an opportunity to make a follow-up study on that point.

In view of the fact that infection and premature absorption of catgut sutures are two very important causes of postoperative hernia, it seems to me that such hernias will occur less frequently following the silk closure, because through its use the incidence of infection is lowered and the tissues are surely approximated until union is complete.

Apropos the premature absorption of catgut I have seen five cases which had been closed by means of 20 day chromic gut sutures, in which the entire wound reopened within ten days after operation, with no sign of infection present. At the time of reclosure, the original catgut sutures were found to have given way through premature absorption. The knots and a few frayed strands of catgut were all that remained of the original suture material. The tensile strength of any form of catgut is practically destroyed before the tenth day, and in certain cases the union is not reliable at that time. With silk sutures no such accident has happened.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

THE KIELLAND FORCEPS

BY J. P. GREENHILL, B.S., M.D., CHICAGO, ILL.

IN May, 1915, Christian Kielland of Norway presented a new type of forceps before the Munich Gynecological Society. Since that time a large number of papers have been written and many discussions have arisen regarding the forceps. The instrument has been hailed by some as the greatest advance in obstetrics in recent years while others have condemned it. The weight of evidence, however, is clearly in favor of the new instrument which differs from the ordinary type of forceps in the following respects: It is somewhat lighter in structure, its lock is not fixed but is sliding in character, and it has only an extremely small pelvic curve. The shape of each blade resembles that of a German bayonet. (See figures.)

The blades of the new forceps can always be applied to the biparietal diameter of the fetal head, hence these forceps are particularly adapted to the cases where the head is high and the sagittal suture runs transversely. For such cases the axis-traction forceps were devised many years ago but the disadvantages of this instrument are many. Kielland believes that the difficulties encountered with the axis-traction forceps are not ascribable to the pelvic contraction but to the incomplete rotation of the head. In most of the cases where the head is high in the pelvis, when the axis-traction or the ordinary forceps are applied, one blade comes to lie over the occiput and the other over the brow and face. The blades do not fit the head properly. Only the tips really touch the child's head while the remaining portion stands away from the head. Because of this, the circumference of the object of expulsion is enlarged and extensive lacerations result. Not only extraction but also rotation is made very difficult by such an application. When rotation is performed the vaginal mucosa moves with the forceps and suffers much damage. Difficulty in rotation may occur not only when the head is in high, but also in deep transverse arrest.

To overcome these difficulties, Kielland devised the new type of forceps and also a new method of applying these forceps. He lays down the following rules for the application of his forceps to a head which lies in the transverse diameter. (Kielland does not give advice on the use of his forceps in cases where the occiput is anterior.)

Before applying the forceps a correct diagnosis must be made regarding the station of the head, the direction of the sagittal suture and the position of the large and small fontanels. Before applying the forceps they should be held in front of the vulva in the position they are to assume in the pelvis. The slight pelvic curve of the instrument is to face the occiput. The blade which is to lie anteriorly and which, therefore, is to lie between the symphysis and the fetal head must always be inserted first. Two fingers of one hand are placed on the head under the anterior lip of the cervix. The other hand inserts the anterior blade with the concave surface of the cephalic curve facing the symphysis, horizontally along the fingers in the vagina until the tip has passed the symphysis. The handle is then depressed and the blade carefully pushed up into the uterine cavity. When high enough, it is rotated on its long axis 180 degrees, in the direction of the pelvic curve of the blade. To avoid confusion there is on each

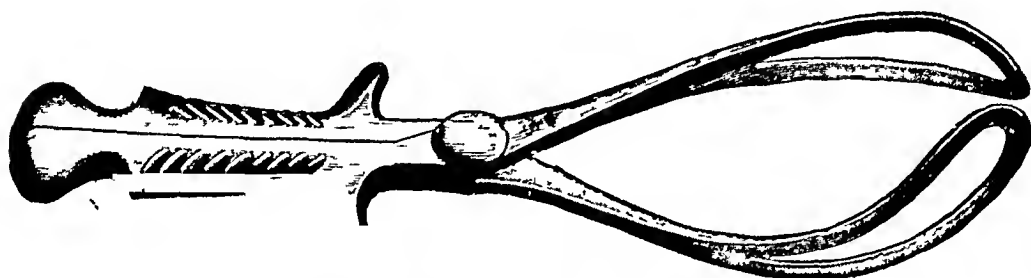


Fig. 1.—Naegele forceps. Front view.

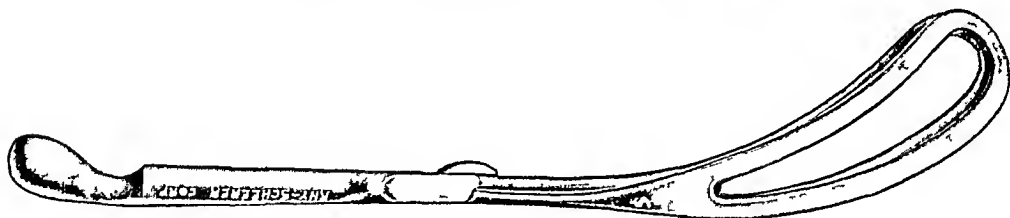


Fig. 2.—Naegele forceps. Side view.

handle a small knob which indicates the direction in which rotation is to take place. To apply the posterior blade, two fingers are inserted to locate the cervix and the blade is inserted either in front of, or slightly to one side of, the promontory and to that side of the first blade which will favor locking without the necessity of crossing the blades. When the blades are locked, the forceps grasp the head symmetrically in the biparietal and bimalar diameters. The introduction of the blades, especially the anterior one, is usually accomplished with amazing ease and always, according to Kielland, without injury. At autopsy on two women delivered with the new forceps no injury to the uterus was found. Since the forceps are applied symmetrically they do not tend to slip and rotation of the fetal head can be accomplished without injury. These forceps, however, should not be used to overcome definite cephalopelvic disproportion or a rigid perineum. When there is resistance to the insertion or to rotation of the anterior blade the latter should not be forced into place but should be inserted as the old forceps are, that is, the blade should be made to wander into place. It may be difficult to insert the posterior blade as high as the anterior one, especially in contracted pelvis but this does not

cause trouble; for these forceps may be locked even when the blades have not been inserted to the same height. During the first traction the blades become symmetrical.

After being locked, the blades lie in the anteroposterior diameter of the pelvis. Traction should be made in the direction of the handles more posteriorly than anteriorly. When this is done the head rotates spontaneously. One may with the forceps completely rotate the head anteriorly in the pelvic cavity before making traction. Rotation should be accomplished without simultaneous traction. At the outlet the handles should not be elevated as one is tempted to do because of training with the old forceps. The application of these forceps for brow and face presentations is the same as for occiput presentations. Since the chin is the point of direction in face presentations, the pelvic curve of the forceps must be made to look toward the chin.

The advantages of the new forceps and the new method of applying them are, according to the inventor, first the ease with which the forceps are applied regardless of the station of the head and the direction of the sagittal suture. The head is not displaced when the blades are inserted. The forceps cannot possibly slip off the head and the

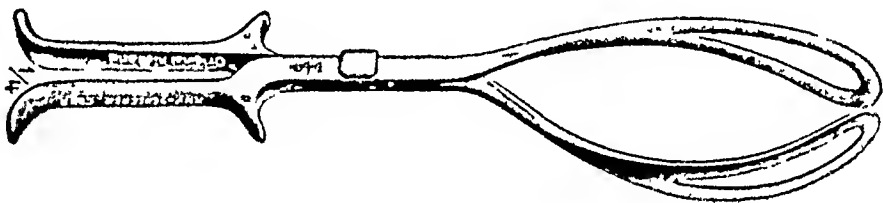


Fig. 3.—Kielland forceps. Front view.

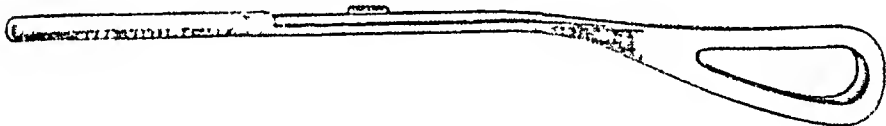


Fig. 4.—Kielland forceps. Side view.

grasp is harmless to the child. The application is not only symmetrical but also ideal and remains unchanged during traction, which can be made in the direction of the handles. The blades are applied to that part of the child's head which can best endure pressure, namely the cheeks and the underlying bones. There is no pressure on the skull, orbit, brow, nose, neck or facial nerve as so often occurs when the old forceps are applied to an unrotated head. Because the blades fit the head exactly, this instrument is safe for rotation purposes. Likewise these forceps may be used when the cervix is incompletely dilated with much less damage than the classic forceps. Finally, due to the symmetrical application of the blades on the head, extraction is attended with much less force than is necessary with the other types of forceps.

From 1908 to 1915 Kielland with his forceps delivered 352 women, of which 197 were primiparas. In 302 cases the sagittal suture was in, or almost in, the transverse diameter. There were 5 brow and 6 face presentations. One mother died but she had had an infection before delivery. There was not a single third degree laceration or tear of the bladder or anterior vaginal wall. One child was stillborn

(premature), two children died soon after delivery (one brow and one face in primiparas), and two died on the third and fourth day, respectively. (Their mothers had contracted pelves.) The fetal mortality, therefore, was 1.4 per cent.

The first to seriously undertake an investigation of the Kielland forceps was Saenger in Doederlein's clinic in Munich. In 1916 he reported the results of his experience in 42 cases, among which were 32 primiparas and two with deflection attitudes (one face and one brow presentation). One mother died of eclampsia and on postmortem examination the uterus showed no evidence of injury. One child was born dead, but no heart tones could be heard before delivery. A second child died of hemorrhage from the cord one and a half hours after delivery. Autopsies on both failed to show intracranial lesions. Saenger applied the forceps as Kielland advised and experienced no difficulty except in one case. He was very enthusiastic about the forceps and claimed that not only was delivery much easier than with the old forceps, but both time and anesthesia were saved because there was less damage for repair.

Hamm in 1917 in a paper on the comparison of the forceps as an instrument of rotation and the method of combined rotation of the fetus into an occiput presentation as advocated by Fehling, advises in anomalies of presentation and attitude where the head is not engaged, that the combined method of rotation be performed. If this procedure fails the Kielland forceps should be applied, but they should be used by specialists only.

In the same year Rosenfeld demonstrated the new forceps before the Obstetrical and Gynecological Society of Vienna and recommended them very highly. In the discussion which followed the demonstration, Schauta said that the rotation of the anterior blade in the uterine cavity was dangerous and was only to be done by a master in obstetrics. He said that this procedure alone was sufficient to condemn the new instrument since forceps are to be used by the general practitioner. The only use he could see for this instrument was in cases of high transverse arrest in face presentations. Halban claimed the Kielland method of inserting the anterior blade was anatomically correct and should be tried a sufficient number of times before it was condemned.

In 1919 Küster reported 19 cases in which the Kielland forceps had been tried. Later, before the Breslau Gynecological Society, he reported the results in 22 cases. So enthusiastic was he that he acclaimed the new type of forceps as the most important advance in instrumental obstetrics in recent years. Among his cases were one forehead, one brow and one face presentation. Küster advised removal of the old type of forceps and the axis-traction forceps from the hands of practitioners and their replacement by the Kielland instrument. In the discussion of the second paper, L. Fraenkel spoke favorably of the new instrument but preferred the forceps he himself devised. Küstner could see no danger in the use of the Kielland forceps but urged that they be used by specialists only.

In June, 1919, Stroeder demonstrated the new forceps before the Hamburg Obstetrical Society and praised them very highly. At about the same time, Puppel proclaimed the advantages of the instrument

before the Medical Society of Mainz and said it was the obstetric forceps of the future.

Five years after his first presentation, Kielland again spoke before the Munich Gynecological Society. At this time Saenger reported that the total number of cases in which the Kielland forceps had been used was 60. There was no maternal death. The fetal mortality was 3.8 per cent but no baby showed intracranial hemorrhage. Since 1915 Saenger has used no forceps other than the Kielland, and recommends them not only for the specialist in obstetrics but also for the general practitioner. In the discussion, Doederlein confirmed what Saenger said about the results in his clinic. (However in June, 1923, I heard Doederlein say that as far as his own experience with the Kielland forceps was concerned he was not prepared to venture a definite opinion.) Mueller pointed out that the Waleher position is a valuable adjunct to the use of the new instrument and Adler maintained that its employment made no technical, but only diagnostic, exactions from the obstetrician.

Stoeckel in his Textbook of Obstetrics (1920) mentions the Kielland forceps but does not feel there has been sufficient experience to permit the general practitioner to use them.

In November, 1920, Meumann spoke before the Leipzig Obstetrical and Gynecological Society on the subject of high forceps in contracted pelves. He reported that in Zweifel's clinic during the previous two years the Naegele forceps had been given up almost entirely in favor of the Kielland forceps in cases where the head was high. The results were very favorable. Only one child died; but an attempt had been made to deliver this baby with the Naegele forceps before the new forceps were applied. Meumann believes the new instrument is the best there is for high heads, but emphasizes that an accurate diagnosis is necessary before applying the forceps. In threatened rupture of the uterus the typical Kielland application should not be used, but the blades should be made to wander into place. Meumann also believes that before cesarean section is performed an attempt may be made to extract the child with the new forceps without harm to the child. Only specialists should use these forceps. Klien, in discussing this paper, expressed the belief that for high heads the Kielland forceps places all other forceps in the shade. Hodiesne saw advantage of the new instrument in flat pelves because it diminishes the biparietal diameter of the baby's head. Schweitzer told of the very good results obtained with these forceps in cases where perforation had been the only other alternative.

Sachs called attention to what he believed to be a source of danger in the use of the Kielland forceps. He had been getting very good results with the new forceps but in one case where the head was high the cord was included in the grasp of the forceps. A quick delivery saved the child. Such an occurrence, Sachs believes, cannot always be prevented when using the Kielland forceps; hence the heart tones should be carefully controlled after the application of the forceps.

In 1921, Hoffmann reported his results in six cases and was very enthusiastic about the new instrument. He had also used it in the low cervical cesarean section with excellent results. One patient, who was delivered with the Kielland forceps because of pneumonia, died of the pneumonia and autopsy showed the uterus to be intact.

In his monograph on Diagnostic and Therapeutic Mistakes in Labor, and Their Prevention (1921), Fehling warns against the use of the Kielland forceps which he claims are difficult to apply and will do more harm than good. However, Fehling evidently had not been using the Kielland forceps for he speaks of a three-bladed instrument whereas the Kielland instrument has only two blades. In a review of this book Loeser emphasizes Fehling's objection to the Kielland forceps without correcting Fehling's error regarding the number of blades.

Berecz reported the results obtained with the Kielland forceps in Toth's clinic in Budapest. The forceps were used in 26 cases and were applied in the way the old forceps are applied. No mothers were lost and only one baby was born dead, but its heart tones could not be heard before delivery.

In 1921, Riediger presented his results in 29 cases, in six of which the head was floating at the time of delivery. So well pleased was Riediger that he believes the Kielland forceps not only replace the classic forceps but they also extend the field for the use of forceps. In the discussion of this paper, Benthin claimed that the Kielland forceps were better than the old forceps only when the head was high. Fink reported success in three cases where the head was not engaged but in one case he had to replace the Kielland forceps by the Naegele. Schroeder heartily recommended the new instrument as he never had any failures with it.

Mayer related very successful results with the Kielland forceps in 13 instances where the head was above the spines. All the children were born alive, but in two cases there were extensive tears in the vaginal mucosa. This, Mayer emphasizes, might have resulted from the use of the classic forceps. Mayer believes that the fear of rotating the anterior blade in the uterus is unfounded. He advocates the use of these forceps for specialists only and where the pelvis is normal, especially when the head is high. If, however, forceps are applied in contracted pelvis more can be expected from the Kielland instrument than from the old type of forceps. When the outlet is contracted, the new forceps are definitely superior. There should be no extension of the indications for the use of forceps, but the Kielland forceps can be used very successfully in anomalies of flexion and station of the fetal head, cases where the classic forceps are unsatisfactory. In discussing this paper, Kupferberg said that he had obtained very good results with the new forceps in 40 deliveries and that he uses the new instrument for all types of cases. He believes it should be the only type of forceps extraction taught to students. Fehling opposed the new instrument because it widened the field for forceps operations. He believes it should be used only in hospitals. Opitz said he had not found it necessary to use the new forceps and feared that because of them, high forceps operations would again become frequent. He agreed with Schauta that the only indication for the Kielland forceps was a face presentation where the head was high.

In 1922 at the biannual meeting of the German Gynecological Society held in Innsbruck there was quite a discussion on the Kielland forceps. Rosenfeld presented the results of a study of 135 cases in which the Kielland forceps had been used. The Kielland application

was employed and delivery in nearly all the cases was very easily accomplished and without any damage. All the babies were born alive, but four died postpartum (3 per cent). No baby or mother showed marked injury. Rosenfeld also used the new forceps to hold the head in three cases where perforation was necessary, and then extracted the perforated heads very easily without a cranioclast. He has used the new instrument for five years and believes it should be in the hands of every obstetrician and its application should be taught in every clinic.

A second paper read before the German Gynecological Society on this subject was by Krull, who reported the results in 93 cases. Sixty-three were his own, while 24 were those of his former assistants, Tittel and Rössler. In almost half the cases the pelvis was contracted. The typical application was used in most cases and in one case the cord prolapsed as the anterior blade was rotated. The child was delivered alive. One woman died of eclampsia and at autopsy the uterus showed no injury. Krull believes the Kielland forceps are very good for purposes of rotation and will pull the head through the pelvis with little damage. The instrument supplements the old forceps but should be used by specialists only.

A third paper read at the Innsbruck meeting was by Hoffmann, whose experience is based upon 116 cases and who believes the Kielland forceps render delivery easy, particularly in flat pelvis where the head is high. Hoffmann believes the new forceps diminish the biparietal diameter, and hence decrease a cephalopelvic disproportion. The application of the anterior blade, as advocated by Kielland, is not more dangerous than ordinary version. The Kielland forceps are excellent and harmless for rotation, only one application being required even for rotation of 135 degrees; hence the Seanzoni maneuver is made unnecessary. Hoffmann believes the new forceps should be the only type of forceps taught to students. Since the introduction of the Kielland forceps in the Dortmund clinic there has never been a need for any other forceps.

Still another paper read at Innsbruck bearing on this subject was by Weinzierl. He discussed the treatment of high sagittal arrest of which he collected 18 cases from 9000 labors. Nine of the 18 cases were delivered by forceps of which seven were by means of the Kielland forceps (4 pos. pub. and 3 pos. sacr.). In only 3 of the 7 cases were the pelvis normal, and in all but one the head was movable above the inlet. In each instance the blades were easily applied to the sides of the baby's head and the head was rotated to the transverse position easily. On the pelvic floor the head was again rotated to an anterior position. In two cases there was difficulty due to pelvic contraction. Two babies were born dead, but the other children and the mothers were uninjured. Weinzierl believes the Kielland forceps are very useful and in contracted pelvis advises their use in conjunction with symphysiotomy. In a later paper he reported two additional cases of high sagittal arrest in which the new forceps were used.

A lively discussion followed the presentation of the above four papers at the Innsbruck meeting. Eisenreich related that he successfully delivered with the Kielland forceps three patients after the Naegele forceps had failed. Hammerschlag praised the new instru-

ment but pointed out that, occasionally on insertion of the anterior blade, the head is pushed up out of the pelvis. Guggisberg insisted that the Kielland forceps were unnecessary when the head was low and that the forceps should be used only by specialists. Temesváry had used the new instrument 16 times, in 13 cases the head was high, and there was one face and one brow presentation. There was no injury to mother or child. Temesváry believes the use of this instrument should be taught to students. Puppel used the Kielland forceps five times. He claimed the instrument was somewhat difficult to apply but that rotation and extraction with these forceps were very easy. Saenger recommended that the forceps be used in cesarean sections and on the after-coming head. Zimmermann used the forceps six times but in three, because of a tendency to slip, he had to replace them with the Naegele forceps. Mayer remarked that the Kielland forceps can supplement the Naegele but not replace them entirely. It was the belief of Sellheim that a better forceps than the Naegele for normal pelves was unnecessary, hence it was not a question of Kielland versus Naegele forceps but of Kielland versus Tarnier forceps. Sellheim obtained better results with the Naegele forceps in normal pelves, and believes the Tarnier is better than the Kielland forceps in contracted pelves. Stratz agreed with Sellheim that there is no need for a new instrument but he admitted he had never tried the Kielland forceps. On the other hand Baumm believes the new forceps are better than the Naegele when the head is high. Pankow also favored the Kielland instrument because it permits surprisingly easy rotation and extraction, but he wonders whether more ruptures of the perineal muscles might not result from this.

In an inaugural dissertation on the use of the Kielland forceps in Schmidlechner's clinic in Budapest, Lüps praises the new instrument very highly and believes it can be used on any head presentation regardless of its position, station or degree of flexion. He also advocates the use of the new instrument on the after-coming head. The Kielland forceps were used in seven troublesome cases but all the deliveries were easily accomplished. One mother died of eclampsia. Lüps believes the new forceps not only entirely replace the ordinary forceps but also save some babies from craniotomy. He recommends that their use be taught to students, as is being done in Toth's clinic in Budapest.

Meumann in a paper on brow and face presentations reports that in a series of seven forceps deliveries for brow presentations the only one which was easily accomplished was the one in which the Kielland forceps were used. In a series of 24 face presentations delivered instrumentally there was a fetal mortality of 50 per cent. This high mortality was due mainly to the use of the ordinary type of forceps which cannot be applied properly in these cases. The Kielland forceps on the other hand permit proper application and easy delivery. Meumann believes the use of the Kielland forceps will greatly improve the prognosis of both brow and face presentations.

In a later report by Meumann of sixty cases where the new forceps had been used, the pelvis had been contracted in forty and Meumann believes that at least twenty of the babies were saved from craniotomy by the new instrument. He emphasized that the anterior blade should be inserted only after the patient had been narcotized. In discussing

this paper Skutseh expressed fear of the Kielland application, and advocated inserting the blades as is customary with the old forceps. Thies agreed on the great value of the new forceps in certain cases but did not believe it was advantageous in face and brow presentations. He believed the forceps were too lightly constructed for cases where very forceful traction was necessary.

Bruch, who used the Kielland forceps 50 times, did not apply the anterior blade as Kielland recommended. He successfully delivered four brow presentations and one face presentation with the new instrument. In all of the 50 cases application, rotation and extraction were easy. Bruch recommends the new forceps to the general practitioner. He believes, however, that in generally contracted pelves the Naegele forceps are better than the Kielland, because the generally contracted pelvis is too low to permit the proper application of the Kielland forceps.

In a second publication Mayer reported the use of the new forceps in 15 atypical cases where all the children were born alive. Mayer sees advantages of the Kielland forceps in three directions: namely, where there is a narrow pubic arch, where there is pelvic inlet dystocia and where there is an anomaly of cephalic flexion, (deflexion and asynclitism). The old forceps should not be used when asynclitism is present.

Zimmermann in a report of his experiences with the Kielland forceps in six cases, stated that he had three failures, and these he attributed to the weak construction of the instrument. The latter must be given a more extended trial before recommending it to the practitioner.

Mathes believes the chief advantage of the Kielland instrument is its ability to overcome bony resistance when the head is high and he cites an example.

In a paper read before the Berlin Obstetrical and Gynecological Society, v. Schubert reported the results obtained with the new forceps in Franz's clinic. Thirty patients were delivered and no mothers or babies were lost. Neither were there any severe lacerations. There were four anomalous flexion attitudes (face, brow, forehead and anterior parietal bone presentation). In one case the cord prolapsed upon insertion of the anterior blade but the child was delivered alive. Three high forceps deliveries were accomplished in three, four and two minutes respectively. v. Schubert warns against the possibility of making a false passage between the anterior lip of the cervix and the vaginal mucosa. He believes the Kielland forceps have made the Tarnier forceps obsolete and that they can be used with less danger in any case where any other type of forceps can be used. No more skill is required to use the new forceps than is necessary for the old forceps. In the discussion of this paper, Kielland said his instrument was not a universal one, and should not be used to overcome bony resistance. The new forceps do not diminish the volume of the fetal head, neither do they increase it. Carl Ruge II reported the results of twenty patients delivered with the Kielland forceps in Bunn's clinic. The results were excellent. Ruge calls the new instrument the forceps of the future and advocates their use by the general practitioner.

In the discussion of a third paper by Meumann read in Leipzig,

Zangemeister reported the first ease of rupture of the uterus where the Kielland forceps were used. Sellheim claimed that applying the forceps in the anteroposterior diameter of the pelvis diminished the size of the pelvic cavity. He was opposed to recommending the new forceps to the practitioner.

In a still later paper, Meumann informs us that previous to the use of the Kielland forceps in the Leipzig clinic only 82.4 per cent of the high forceps deliveries were successful and only 60.8 per cent of the children were born alive. In the cases of high forceps where the Kielland instrument was used, 94 per cent of the babies could be delivered and 81.3 per cent of them remained alive. Slipping of the blades is impossible if the forceps grasp the fetal head properly. Meumann recommends the Kielland forceps not only for normal but also for contracted pelvis, and also for the purpose of rotation.

Frey, speaking of the results obtained in Zürich, said the new forceps were so good that since their introduction the Naegele forceps had not been used. The new instrument was used in 75 cases. Guggisberg while agreeing with Frey on the advantages of the Kielland forceps when the head was high felt that the general use of this instrument would lead to a laxity in placing indications for forceps deliveries.

Bokelmann believes that a correct model of the old forceps can accomplish everything which the Kielland instrument accomplishes. For many years in dealing with transverse arrest he has been placing the anterior blade of the ordinary forceps directly under the symphysis without making it wander, even when the head was high. This gives an anteroposterior application exactly like that with the Kielland forceps and this application is easily carried out. Bokelmann believes the new forceps are especially adapted for face and brow presentations.

A comparison of 85 high Naegele and 43 high Kielland forceps deliveries was made by Hermstein. Among those delivered with the Kielland instrument one mother, who had cardiac decompensation, died. More extensive lacerations occurred in the series of Naegele forceps deliveries. Like Sachs, Hermstein had a case where the cord fell between a forceps blade and the fetal head when the Kielland instrument was used. He comes to the conclusion that the Kielland forceps are better than the Naegele forceps when the head is high. However, for their proper use obstetric knowledge and experience are necessary and an extension of the indications for high forceps operations is not to be fostered.

Heidler analyzed 100 cases delivered with the Kielland forceps in Kermauner's clinic in Vienna. There were 79 primiparas and of these 13 were over 35 years of age. In 53 cases the head was high, and in 13 additional ones it was barely engaged. In 67 cases the anterior blade was rotated in utero. Heidler points out that difficulty in rotating the anterior blade in the uterus is a danger signal and warns one against using forceps because the pelvis is contracted or the head is too high. Among the 100 cases were three brow presentations, six cases of asynclitism and one high sagittal arrest. Failures were encountered on an after-coming head, in two contracted pelvis and in one brow presentation where the head was high. Nearly all the other cases were terminated with great ease. Of six maternal deaths.

only one could be attributed to the Kielland forceps. In most of the primiparas an episiotomy had been performed; but despite this, there were extensions of episiotomy in 27 cases. Heidler, therefore, advises an extensive episiotomy before applying the Kielland forceps. A rupture of the uterus occurred in one of the patients in whom the application of the forceps was accomplished with great difficulty. Because the forceps could not be locked properly they were removed and reapplied, but again with great difficulty. Once more the blades could not be locked. Examination revealed the head to be free above the pelvic inlet. The posterior blade was removed without difficulty; but as the anterior blade was being withdrawn, resistance was met. This was forcibly overcome and the operator experienced the sensation that something had torn. To save the child, a rapid version and extraction were performed. Great difficulty was encountered in freeing the right arm and it was liberated only after fracturing the humerus. In the lower uterine segment a tear was found; so a laparotomy was performed and the uterus removed. The patient left the hospital on the twelfth day.

I feel that this accident should not be attributed to the Kielland forceps. In the first place the operator was warned twice by the extreme difficulty in applying the blades that the case was not one for forceps. Furthermore the sensation of a tear was felt, not upon the insertion but upon the removal of the anterior blade and only after much force had been used to overcome a definite resistance. To add to the *lapsus artis*, version and extraction were performed on a fullterm child in a ruptured uterus.

Heidler also reported a case of incomplete rupture of the uterus which occurred after craniotomy on a baby whose delivery had been attempted with the new forceps. There was a general fetal mortality of 9.2 per cent. From his experience Heidler believes that the Kielland instrument is a very definite advance in operative obstetrics and he considers it to be a universal forceps.

In a later article, Heidler reports 50 additional cases delivered with the Kielland forceps. Of these, 32 were high forceps and two were face presentations. The fetal mortality was 12.2 per cent and there was one maternal death which the author does not attribute to the forceps. Another case of laceration of the lower uterine segment occurred and here also there was a spontaneous recovery. While Heidler praises the new forceps very highly, he does not believe they cause less damage to the maternal soft parts.

In what he claims to be a critical review of the Kielland forceps based on the statistical reports of 32 authors, Fink condemns the new instrument. He maintains that the belief in the safety of the forceps has been shattered by Zangemeister's report of a case of rupture of the uterus. In his own clinic he saw at autopsy, two cases of injury to the posterior cervical wall. One of these patients had died of eclampsia. In the other, the author admits that the injury to the cervix was in a place where the head had caused necrosis by very long continued pressure. A similar necrotic area from pressure was found in the anterior cervical wall. Despite this, Fink attributes the injury and the death to the Kielland forceps. In one case, on insertion of the anterior blade, the head was pushed upward necessitating delivery by version and extraction. Fink had one case where the

forceps showed a tendency to slip and mentions a few other authors who had similar experiences. He also questions whether delivery can always be accomplished even if the forceps are properly applied, and cites three failures. In his cases 70 per cent suffered damage to the soft parts. He also challenges the supposed ease with which delivery can be accomplished with the new forceps and tells of one case where three individuals exhausted their strength in an attempt to deliver a patient. This patient delivered spontaneously a few hours later. He tells of another of his cases where two operators kept up a relay in an attempt to pull the head of a baby which weighed 4150 gm. (nine pounds two ounces) through the inlet into the pelvic cavity. (Such individuals evidently do not know the expression, "*Non vi, sed arte.*")

Twenty-four of Fink's 54 cases were high forceps deliveries. In the cases with normal pelves, the deliveries were accomplished with surprising ease and rapidity. In cases of cephalopelvic disproportion, Fink says, extraction may be so difficult that the strength of one individual may not be sufficient. Fink encountered lacerations of the vagina in a few cases in which he used the instrument for rotation purposes. However, he tells of a very easy rotation with the new forceps in a contracted pelvis where the Naegele forceps had failed. He does not believe there has been sufficient experience to permit an opinion on the use of the Kielland forceps in cases of cephalic deflexion (forehead 45 cases, brow 15 cases, face 15 cases).

Fink maintains that the Kielland forceps are unreliable, and has collected 15 cases from literature where delivery was accomplished with the Naegele and Tarnier forceps after the new forceps had failed. (Krull, Thies, Bruch, Mayer, Zimmermann, Sellheim, Baumm, Küster and Fink).

In Fink's series there were six maternal deaths but only two of these he attributes to the Kielland forceps. One of the latter patients died of sepsis; but she had a temperature of 101.6° before delivery and had had many vaginal examinations at home before admission to the hospital. The other death was the one to which reference was made above regarding the injury to the posterior cervical wall at the site of pressure necrosis. Another death in this series might be of interest. The cause of death was listed by Fink as heart failure; but before the patient died she was subjected first to an attempt at forceps delivery, then to a symphysiotomy which failed to permit delivery, and finally to a cesarean section. There were 11 fetal deaths but only three showed cranial or intracranial injuries at autopsy, and one of these three was the child of the patient who had been subjected to the multiplicity of obstetric operations. I might add that Riediger, in criticizing Fink, said that when the latter first used the Kielland forceps, he applied them incorrectly and had to be shown how by an assistant. Riediger said that in a total of nearly 200 Kielland forceps deliveries performed by many operators at the Dortmund clinic, the results were excellent.

Very recently, Spitzer reported the results of five years' experience with the new forceps in 132 cases. In 59 the head had been high and it had been found movable above the pelvic inlet 40 times. In only 35 per cent had the cervix been completely dilated. Ninety per cent of the patients were primiparas and 65 per cent were over thirty years

of age. In five cases where craniotomy was necessary the Kielland forceps were applied and the head perforated. An easy extraction of the child followed in every case and made a cranioclast unnecessary. Spitzer makes the statement that in over 2,000 deliveries with the Kielland forceps no case of rupture of the uterus has occurred. He evidently had not heard of Zangemeister's case or Heidler's first report. Despite the lack of complete dilatation in most of Spitzer's cases and despite the fact that in these cases the cervix was not incised, very few cervical lacerations resulted. An episiotomy was performed in 90 cases and extension of tears resulted in 22; but it should be recalled that most of the patients were old primiparas and in almost half the head was not engaged. Two face presentations were very easily delivered. Two mothers died, one of sepsis for which indication the forceps delivery was performed, and the other of pelvic peritonitis which was also the indication for interference. The fetal mortality was 5.3 per cent but in reality only one fetal death was attributable to the forceps operation, despite the fact that 45 per cent of the deliveries were high forceps deliveries. Spitzer is convinced that such good results cannot be obtained with any other type of forceps.

At about the same time Hirschberg reported excellent results with the Kielland forceps in all types of head presentations and also in breech cases on the after-coming head. Babies which could not be delivered with the Naegele forceps were readily delivered with the Kielland forceps. Thirty-nine patients were delivered with the new forceps and in not one was there an extensive laceration. In two cases of prolapse of the cord, live children were delivered through definitely contracted pelves.

Winter, in a talk on forceps operations before the Northeast German Gynecological Society, pointed out the advantages of the Kielland forceps over the Naegele in cases of high transverse arrest, in unrotated face and brow presentations and especially on the after-coming head. In the discussion, Fink criticised the Kielland instrument while E. Schröder praised it.

The only mention of the Kielland forceps in the English language aside from abstracts of the foreign literature, is made in Williams' new edition of his Textbook of Obstetrics. Williams has never used the new instrument and expresses no opinion concerning it.

My own experience with the Kielland forceps is limited to twelve cases, of which five were high forceps deliveries. I did not use the Kielland method of applying the forceps but made the blades wander into place. Very good results were obtained in all cases but one, in which a vesicovaginal fistula resulted from a laceration of the anterior vaginal wall. However, in this patient two attempts to induce labor were made (bougie and bag) before results were obtained. At the time of delivery, after the patient had been in labor for two and a half days, her temperature was 102.6 degrees. The cervix was not completely dilated and had to be incised to permit delivery. The fistula healed spontaneously and both mother and child left the hospital in good condition. A second complication which I had was separation of the placenta by the posterior blade of the forceps. Profuse bleeding occurred. A live baby was delivered after

removal of the Kielland instrument, manual rotation of the head and the use of the Simpson forceps.

I feel that the Kielland forceps are distinctly helpful when the head is above the spines of the ischia, and also when the head is engaged, but where the occiput is not in an anterior position and cannot be brought into an anterior position manually. Where the head is engaged and the occiput is or can be rotated anteriorly, I believe better results can be obtained with the Simpson forceps. A disadvantage of the new forceps which I should like to point out is, that in making traction, the shafts of the blades press downward against the perineum, in consequence of which it is difficult to avoid contact with the anus.

SUMMARY

There have been 36 statistical reports concerning the use of the Kielland forceps in 1762 deliveries. In addition, 27 other individuals have expressed opinions about the new forceps and nearly all feel that the new instrument is a definite advance for delivering babies when the head is high and when the occiput is not in the anterior half of the pelvis. Most authors agree that the insertion of the anterior blade in the uterus is easily accomplished and without danger, and that maternal lacerations are less frequent than with the old types of forceps. The new forceps do not slip because there is an equal distribution of pressure all over the skull and the results for the children are very good. Rotation is easily accomplished and without damage. A biparietal application is always possible, the normal mechanism of labor can readily be imitated and less force is necessary for delivery. About half of the authors feel that the use of the forceps should be restricted to specialists in obstetrics. Of 61 individuals who have written or spoken about the Kielland forceps only six maintain that the new forceps are harmful or unnecessary. They are Schauta, Zimmermann, Sellheim, Opitz, Stratz and Fink. Schauta and Stratz never used the Kielland forceps and the others, except Fink, had very little experience with them. Fehling also opposed the new forceps but he spoke of a three bladed instrument.

Very recently Hiess in an article on high forceps operations expressed the opinion that the Kielland instrument was better than other forceps where high forceps were required. In the same issue Gäussbauer reported two cases in which the umbilical cord was torn by the anterior blade of the Kielland forceps. In one case there was profuse bleeding but the child was born alive. In the other case there was no bleeding but the baby was born dead. Gäussbauer does not believe these two cases should bring discredit to the Kielland forceps, because in his series of 80 cases, he had very good results. He does, however, caution against rotating the anterior blade in the uterus.

BIBLIOGRAPHY

- Baumn*: Arch. f. Gynäk., 1922, cxvii, 136. *Bentlin*: Monatsschr. f. Geburtsh. u. Gynäk., 1921, lv, 113. *Berecz*: Orvosképzés, 1921, xiv, (Lüps). *Bockelmann*: Zentralbl. f. Gynäk., 1923, xlvii, 59. *Bruch*: Monatsschr. f. Geburtsh. u. Gynäk., 1922, lviii, 265. *Döderlein*: Monatsschr. f. Geburtsh. u. Gynäk., 1922, lvii, 283. *Eisenreich*: Arch. f. Gynäk., 1922, cxvii, 136. *Fehling*: Diagnostische und Therapeutische Irrtümer und Ihre Verhütung in der Geburt. George Thieme, Leipzig, 1921, 37. *Idem*: Zentralbl. f. Gynäk., 1922, xlv, 184. *Fink*: Monatsschr. f.

Geburtsh. u. Gynäk., 1921, lv, 113. *Idem*: Zentralbl. f. Gynäk., 1923, xlvii, 668. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1923, lxiv, 115. *Fränkel*: Zentralbl. f. Gynäk., 1919, xliii, 949. *Frey*: Schweiz. med. Wchnschr., 1923, xiii, 332. *Guggisberg*: Arch. f. Gynäk., 1922, cxvii, 136. *Idem*: Zentralbl. f. Gynäk., 1922, xlv, 1926. *Halban*: Zentralbl. f. Gynäk., 1918, xlii, 16. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1918, xlvii. *Hamm*: München. med. Wchnschr., 1917, lxiv, 1544. *Hammerschlag*: Arch. f. Gynäk., 1922, cxvii, 136. *Heidler*: Arch. f. Gynäk., 1923, cxviii, 334. *Idem*: Zentralbl. f. Gynäk., 1923, xlvii, 1245. *Hermstein*: Monatsschr. f. Geburtsh. u. Gynäk., 1923, lxii, 139. *Hess*: Ein Beitrag zur Kielland Zange, Dissertation, Königsberg, 1922. *Hirschberg*: Zentralbl. f. Gynäk., 1923, xlvii, 875. *Hodicsne*: Zentralbl. f. Gynäk., 1921, xlv, 623. *Hoffmann*: Fortschr. d. Med., 1921, xxxviii, 669. *Idem*: Arch. f. Gynäk., 1922, cxvii, 116. *Idem*: Zentralbl. f. Gynäk., 1922, xlv, 786. *Kielland*: Monatsschr. f. Geburtsh. u. Gynäk., 1916, xliii. *Idem*: Erweiterter Sonderabdruck aus Monatsschr. f. Geburtsh. u. Gynäk., 1916, xliii, S. Karger, Berlin. *Idem*: Zentralbl. f. Gynäk., 1922, xlv, 1856. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1922, lvii, 283. *Klien*: Zentralbl. f. Gynäk., 1921, xlv, 621. *Kupferberg*: Zentralbl. f. Gynäk., 1922, xlv, 183. *Krull*: Arch. f. Gynäk., 1922, cxvii, 110. *Küster*: Zentralbl. f. Gynäk., 1919, xliii, 948. *Idem*: Ztschr. f. Geburtsh. u. Gynäk., 1919, lxxxii, 218. *Küstner*: Zentralbl. f. Gynäk., 1919, xliii, 949. *Loeser*: Zentralbl. f. Gynäk., 1921, xlv, 1868. *Lüps*: Über die Kielland Zange, Inaugural Dissertation, Gebrüder, Legrady, Budapest, 1922. *Mathes*: München. Wchnschr., 1922, lxix, 1013. *Mayer*: Zentralbl. f. Gynäk., 1921, xlv, 1557. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1922, lvii, 138. *Idem*: Arch. f. Gynäk., 1922, cxvii, 136. *Meumann*: Zentralbl. f. Gynäk., 1921, xlv, 617. *Idem*: Zentralbl. f. Gynäk., 1922, xlv, 335 and 1676. *Idem*: Zentralbl. f. Gynäk., 1923, xlvii, 197. *Mueller*: Monatsschr. f. Geburtsh. u. Gynäk., 1922, lvii, 283. *Opitz*: Zentralbl. f. Gynäk., 1922, xlv, 184. *Pankow*: Arch. f. Gynäk., 1922, cxvii, 136. *Puppel*: München. med. Wchnschr., 1921, lxviii, 91. *Idem*: Arch. f. Gynäk., 1922, cxvii, 136. *Riediger*: Monatsschr. f. Geburtsh. u. Gynäk., 1921, lv, 113. *Idem*: Zentralbl. f. Gynäk., 1923, xlvii, 1215. *Rosenfeld*: Zentralbl. f. Gynäk., 1918, xlii, 16. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1918, xlvii. *Idem*: Arch. f. Gynäk., 1922, cxvii, 122. *Ruge. II*: Zentralbl. f. Gynäk., 1922, xlv, 1857. *Sachs*: Zentralbl. f. Gynäk., 1920, xlv, 1186. *Saenger*: Monatsschr. f. Geburtsh. u. Gynäk., 1916, xlv, 231. *Idem*: Arch. f. Gynäk., 1922, cxvii, 136. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1922, lvii, 283. *Schauta*: Zentralbl. f. Gynäk., 1918, xlii, 16. *Idem*: Monatsschr. f. Geburtsh. u. Gynäk., 1918, xlvii. *Schroeder*: R.: Monatsschr. f. Geburtsh. u. Gynäk., 1921, lv, 113. *Schröder, E.*: Monatsschr. f. Geburtsh. u. Gynäk., 1923, lxiv, 116. *v. Schubert*: Zentralbl. f. Gynäk., 1922, xlv, 1856. *Idem*: Ztschr. f. Geburtsh. u. Gynäk., 1923, lxxxv, 134. *Schweitzer*: Zentralbl. f. Gynäk., 1921, xlv, 623. *Sellheim*: Arch. f. Gynäk., 1922, cxvii, 136. *Idem*: Zentralbl. f. Gynäk., 1922, xlv, 1676. *Skutsch*: Zentralbl. f. Gynäk., 1922, xlv, 721. *Spitzer*: Zentralbl. f. Gynäk., 1923, xlvii, 865. *Stiglbauer*: Wien. klin. Wchnschr., 1922, xxxv, 827. *Stocckel*: Lehrbuch der Geburtsh. Gustav Fischer, Jen., 1920. *Stratz*: Arch. f. Gynäk., 1922, cxvii, 136. *Stroeder*: Zentralbl. f. Gynäk., 1919, xliii, 478. *Temesváry*: Arch. f. Gynäk., 1922, cxvii, 136. *Thies*: Zentralbl. f. Gynäk., 1922, xlv, 722. *Weinzierl*: Arch. f. Gynäk., 1922, cxvii, 101. *Idem*: Ztschr. f. Geburtsh. u. Gynäk., 1923, lxxxvi, 221. *Williams*: Obstetrics, D. Appleton and Co., 1923, 462. *Winter*: Monatsschr. f. Geburtsh. u. Gynäk., 1923, lxiv, 114. *Zangemeister*: Zentralbl. f. Gynäk., 1922, xlv, 1676. *Zimmermann*: Arch. f. Gynäk., 1922, cxvii, 136. *Idem*: München. med. Wchnschr., 1922, lxxix, 700 and 1013. *Hess*: Zentralbl. f. Gynäk., 1923, xlvii, 1807. *Gäussbauer*: Zentralbl. f. Gynäk., 1923, xlvii.

Selected Abstracts

Anesthesia in Obstetrics and Gynecology

Schwartz, Otto H., and Krebs, O. S.: Scopolamine-Morphine Semimarcosis. *Journal American Medical Association*, 1923, lxxxi, 1083.

The authors tabulate the results obtained by a definite method of procedure in the use of scopolamine-morphine during the first stage of labor. They feel that scopolamine-morphine is the most effective method of relieving pain. In the first series of 1,000 cases they received satisfactory results in 80 per cent of the cases and in the second series of 1,000 cases in 88.33 per cent. They show practically the same fetal mortality where the method was not employed. Its use is advised only in hospital practice under the supervision of a trained obstetrician and is condemned for the poorly equipped home under the general practitioner's care. It is of special service in primiparae. Asphyxia in the newborn was not found increased in this series.

WM. KERWIN.

Hirschman, N.: The "Standardized-Dosage" Method of Using Scopolamine-Morphine During Labor. *British Medical Journal*, October 14, 1922, p. 669.

The author reports observations on 140 cases, 63 primiparae and 77 multiparae. Morphine causes the analgesic effect primarily, and allows the scopolamine to take effect. The second dose is not required. He sometimes combines atropine, 1/150 grain, with the initial injection of morphine and scopolamine (morphine ¼ grain, scopolamine 1/100 grain). This was followed by hourly doses of scopolamine 1/400 grain. Postpartum hemorrhage and manual extraction of the placenta do not occur more than usual.

F. L. ADAIR.

Greenwood, W. O.: Anesthetics and Analgesics in Labor. *British Medical Journal*, October 14, 1922, p. 667.

The author advocates the use of morphine and scopolamine to lessen the pain and shock incident to labor. He thinks the dose should be varied with the individual patient as well as the succeeding doses. About a half hour after the second dose, the patient should be tested for amnesia. If this procedure is carefully carried out it is without special danger to either mother or child.

F. L. ADAIR.

Kouwer: Painless Childbirth. *Nederlandsch Tijdschrift voor Verloskunde en Gynecologie*, 1922, xxviii, 113.

Kouwer reviews rather exhaustively the history of attempts to lessen the pains of childbirth which, apparently, had its beginning even before the beginning of the Christian era. He pays especial attention to the evolution of morphine-scopolamine semimarcosis and analyzes carefully the reports of various observers in all parts of the world.

He thinks it rather unfortunate that this method has been spread more by advertizing which often smacks of quackery, rather than by the assimilation of scientific reports, which latter are hardly in accord with the exorbitant claims

of the advertizements. He calls attention not only to the glowing report in McClure's in 1914, but also to the appearance in various British magazines of advertizements of so-called "Twilight Sleep Homes." Some of these issue booklets in which claims are made "which are altogether at variance with available scientific data." While women who are confined in these institutions "experience a most delightful slumber, either dreamless or accompanied by dreams of happiest import," nothing is said of the 25 per cent failures which even Gauss admits. Furthermore, the relatives are absolutely excluded in order to spare them the impression which these "delightfully slumbering" women would make upon them.

Kouwer deplores the impression implied by these advertizers and propagandists that childbirth has only one danger, namely pain, the absence of which causes a woman to retain her youth and slender figure, reduces the number of stillborn infants and, as is proved by photographs, produces healthy, vigorous children. That this is really so, is further demonstrated by scores of anonymous testimonials, and the hope is expressed that, eventually, the government will equip similar homes to make this "blessing" available even to the poor and thus increase the birth rate which is so badly needed in England. All dangers and complications are overshadowed by the one big, all-important topic, pain.

He regrets that even some Dutch physicians have been swept away by the advertizing propaganda of this "foreign fad" and ends by expressing the opinion that, when a woman has so far degenerated that she can no longer endure the pain incident to childbirth, she is no longer fit for motherhood. R. E. WOBUS.

Strube: Is Morphia an Antidote in Scopolamin Poisoning? *Zentralblatt für Gynäkologie*, 1923, xlvii, 1460.

It was formerly thought that the toxic and lethal doses of scopolamin were far apart, but with increased use of the drug severe intoxications, including paralysis of the respiratory center, were noted also in normal individuals, even with therapeutic doses; and it was held that morphia acted as an antidote against this intoxication, though the one complemented the other in its capacity to produce insensitiveness. Cremer, who has tabulated the action of the two drugs, found that while scopolamin will increase the pulse frequency and raise blood pressure, morphia slows the pulse and lowers blood pressure. The former is a vasodilator, has a paralytic action on the motor nerves, quickens and deepens respiration, represses secretion, and promotes peristalsis; while the latter is a vasoconstrictor paralyzing sensory nerves and respiration, promoting perspiration, and lessening peristalsis. Cloetta believes, on the contrary, that the combination of scopolamin and morphia adds to the danger of each drug, and that the tolerance for scopolamin in cases of mania says nothing for its tolerance in mentally healthy subjects. Both scopolamin and morphia are narcotics. The strength of a narcotic varies according as it is dissolved by water or fat, the effect being the stronger the more fully the body is soluble in lipoids as compared to water.

The great danger of nonvolatile narcotics lies in their propensity to circulate in the blood longer than the volatile. They can be administered only up to the stage of hypnosis, as complete anesthesia would be followed by asphyxia. With scopolamin and morphia the danger is that the maximum dose for the individual may be inadvertently exceeded.

Four groups of narcotics may be distinguished: (1) Narcotics of the fat series (chloroform and veronal); (2) pure alkaloids (morphia); (3) Tropeine (scopolamin); (4) Cromine combinations. According to Bürgi drugs which work in the same manner may increase their power by combination, while those having different points to attack show in combination a multiplied effect. Strube believes that the multi-

plied effect of the combination of scopolamin and morphia is due to increased alkalinity of the blood in those persons who have severe symptoms of poisoning after even slight doses subcutaneously. Scopolamin is the "chameleon" among narcotic drugs, it is so extremely variable in its effect that it should be resorted to as infrequently as possible.

II. M. LITTLE.

Krönig, W., and Schönholz, L.: Medicinal and Hypnotic Twilight Sleep in Obstetrics. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxii, 161.

The proper place for the use of twilight sleep is a hospital and particularly one with a good personnel. The low fetal mortality obtained with the use of twilight sleep is attributable not to the procedure *per se* but to the careful observation of the fetal heart tones. Twilight sleep is contraindicated in patients with primary atony and marked pelvic contraction. It should be stopped when secondary atony appears and when the patient does not press down during the second stage of labor.

The authors employed not only medicinal twilight sleep but also hypnosis. Among fourteen patients there were two failures. No bad results were noted in either mother or child. Because of the latter fact, the authors prefer hypnosis to morphia and scopolamine since after the latter one may see excitation instead of sleep, apnea of the child and prolongation of labors. On the other hand, after hypnosis some highly intelligent women may suffer from "psychic trauma." For hypnosis a long period of preparation during pregnancy is necessary. The authors believe that a combination of both medicinal and hypnotic twilight sleep would eliminate many disadvantages of either method.

J. P. GREENHILL.

Kogerer: Posthypnotic Birth Analgesia. *Wiener Klinische Wochenschrift*, 1922, xxxv, 513, 538 and 558.

A long and detailed article. The fundamental requirements for the use of this method are first, that the subject must have an imaginative faculty which will allow of her being easily hypnotized and second, that one must not lead the patient into an inner conflict that will remain in her consciousness, a result that may occur when one uses suggestion. The first condition is fulfilled if the patient is easily hypnotized. As regards the second it may be said that when a hypnotized person is given a suggestion which conflicts with her own natural feeling, she may react in three ways: first, the suggestion is ineffective; second, the subject is agitated, may come out of the hypnotic state, and it may be impossible to re-induce it; and third, the ideas conflict, the result of the conflict cannot be foreseen, and there is always a more or less strong spiritual shock, which is unfortunate for the patient and may lead to hysterical symptoms. It is therefore advisable that only a physician and, as a rule, only a psychiatrist should use this method because he would avoid conditions likely to cause failure or bad results.

The technic is as follows: A short explanation is given that hypnotism is a natural phenomenon which has nothing to do with the supernatural; that it is purely a sleep in which one dreams and loses connection with the material world for a short time; and that it is not possible to hypnotize a person if she does not desire it. Then the patient is hypnotized and told first that the hand feels no pain and then that the abdomen feels none. The necessary analgesia cannot be obtained at one sitting, so the treatment is started two weeks before labor is expected and three or four treatments are given. When labor starts she is hypnotized again.

He reports in great detail twenty-seven cases. Nineteen felt none or very few

labor pains. Ten of these felt no pain. Five felt pain when the head came over the perineum; in three of these the head was large; one had a small vagina; and one small pelvic measurements. The other four showed signs of feeling pain but in a much reduced amount. Of the eight poor results, five were hysterical or psychopathic persons. Kogerer feels that it is a valuable method, that it is not dangerous to mother or child, and that it is especially useful for women who fear the pain of labor.

FRANK A. PEMBERTON.

Danforth and Davis: Obstetrics Analgesia and Anesthesia. A Consideration of Nitrous Oxide-oxygen and Various Combined Methods. Journal American Medical Association, 1923, lxxxi, 1090.

They combine several pain-relieving drugs with nitrous oxide-oxygen and obtain most satisfactory results. Nitrous oxide-oxygen started at the end of the first stage is carried throughout the rest of the labor. Thus the majority of obstetric operations can be performed. The more difficult forcep extractions are done under ether. Versions and manual rotation of the head are outstanding exceptions to the use of gas, because the uterus does not stop its activity. This method has proved satisfactory. Maternal mortality in a series of 1,029 cases was 0.39 per cent; fetal mortality, excluding premature babies under 8 months, was 3.5 per cent. Including all premature babies it was 4.6 per cent. Patients convalesce more smoothly because of less exhaustion after nitrous oxide-oxygen. Nitrous oxide-oxygen may be used for examinations and short operations as well as for intermittent analgesia during the second stage of labor, but ether is the choice for long operations during pregnancy and labor.

WM. KERWIN.

Gillespie: Relief of Pain in Labor. Ohio State Medical Journal. 1921, xvii, 669.

Gillespie is an advocate of the use of chloroform in normal labor by the family doctor who must meet the emergency of obstetric practice with the contents of his satchel. He believes that chloroform must be given only at the beginning of the pain and to be truly successful must be applied to the mask before the patient is aware that the uterus is contracting, so that three or four full inhalations may be taken before the height of the pain approaches. Otherwise the patient will be busy sucking in the vapor when she should be holding her breath and bearing down for efficient progress. The amount of chloroform must vary with the force of the pain and the amount of voluntary effort of the mother; hence it must be regulated by the obstetrician himself and not by an anesthetist who judges the requirements by the action of the patient. If the patient does not co-operate properly take the anesthetic away until she does. Obstetric anesthesia is not like surgical anesthesia. Relief from pain in the first stage of labor is more important than anesthesia in the second stage. Hyoscine and morphine may be used in some cases. Chloral may be given by rectum in 45 grain doses or more.

FOSTER.

Martin, A. F.: The Maintenance of "Obstetric Anesthesia" by Infundibulin and Chloroform. British Medical Journal, October 14, 1922, p. 672.

The author advocates the use of chloroform for light anesthesia accompanied by small doses of infundibulin. He draws the following conclusions: (1) That the woman can be rendered amnesic by a light partial anesthesia with chloroform, and the uterus may be kept active by means of repeated small doses of infundibulin, (2) He administers 0.5 c.c. of infundibulin every half hour or so, and administers

the chloroform with the onset of and during the pains; (3) The dosage of the chloroform should be regulated, usually about 3 drachms to the hour is sufficient.

F. L. ADAIR.

Hellendall, H: Pantopon versus Laudanum-Scopolamine Ether Narcosis. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxii, 63.

The author studied a series of 674 patients who were narcotized as follows: Sixty-two received simple inhalation narcosis, 131 inhalation narcosis preceded by morphia, pantopon or narcophine, 100 narcophine and atropine, 266 pantopon-scopolamine-ether, and 115 received laudanum-scopolamine-ether narcosis. There was not a single death though 527 patients had laparotomies.

The author believes that pantopon-scopolamine-ether narcosis is preferable to the mixture with laudanum because 50 per cent of the patients who received laudanum were not sufficiently drowsy one hour after the injection whereas this was true in only 13 per cent of the patients who had received pantopon. After pantopon there was an average saving of 20 grams of ether as compared with laudanum. There were more disturbances attributable to the narcosis after laudanum than after pantopon. However, there was less vomiting after laudanum.

Hellendall warns against the promiscuous use of scopolamine because it is a dangerous drug and very difficult to eliminate from the body. An oxygen tank should always be at hand. Patients who are very old or cachectic, patients with circulatory or respiratory disturbances and children should not receive twilight sleep—inhalation narcosis.

J. P. GREENHILL.

Zimmermann: Aims and Limitations of Local Anesthesia in Operative Gynecology. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1923, lxxxv, 502.

In gynecology, vaginal and abdominal interferences present two very different problems. In the former, an ordinary surgical anesthesia without much relaxation is sufficient; in the latter, a deep anesthesia is necessary to overcome the rigidity of the abdominal musculature. After fairly extensive experimentation with a number of methods, the author comes to the following conclusions: As a method of choice, lumbar anesthesia is to be discarded; it is unreliable in its results and entirely unsuccessful in 3.5 per cent of cases. It is applicable to operations below the navel, and causes good relaxation of the abdominal muscles, but has unpleasant accompanying and after-effects and is very dangerous in seriously ill and cachectic patients. Four cases of 451 were lost as a direct result of lumbar anesthesia. Therefore, it is indicated only when, in an individual case for special reasons, it seems less dangerous than any other anesthetic. It should never be employed for minor operations.

Sacral anesthesia is dangerous and unreliable as it causes skin necrosis and decubitus as well as accompanying and after-effects of unpleasant nature.

Splanchnic anesthesia was employed only in one case and was unsuccessful because of puncture of a vessel. In spite of numerous recommendations from the surgical side, the author could not make up his mind to employ it further, especially as the true pelvis is not included in its region of applicability.

Paravertebral anesthesia, he considers too formidable an intervention. The large number of punctures (26 and more), the great quantities of anesthetic (up to 700 c.c. of one-half per cent novocaine) which are required, make this method too complicated and too dangerous to be valuable.

A submethod, the presacral anesthesia, is better founded. It requires only two injections and minimal quantities of novocaine and gives good results without

after-effects of unpleasant nature. Its applicability is limited to the true pelvis and further injections are required to eliminate the skin nerves of the perineum. This method has been largely given up, because for vaginal operations local infiltration anesthesia gives such ideal results, yet its applicability is limited to such operations.

For laparotomies, particularly for gynecologic laparotomies, general anesthesia is still the method of choice and attended by less failures and disastrous results than any other method. Unavoidable anesthetic deaths are very rare, anesthetic accidents are rare, and could be made more so by careful attention to the technic of administration and proper training of young physicians in the art of anesthesia.

MARGARET SCHULZE.

Bonar and Meeker: The Value of Sacral Nerve Block Anesthesia in Obstetrics.
Journal American Medical Association, 1923, lxxxi, 1079.

A procaine solution was used to block the sacral nerves for the purpose of giving relief from pain during the last part of the first and the second stage of labor in a series of 90 cases. In part of the series a 0.4 per cent sodium bicarbonate was employed to ascertain whether the anesthesia could be prolonged. Epidural injections with transsacral nerve block of the lower four sacral nerves was used in 16 patients. The average duration of anesthesia was 2 hours and 20 minutes. In 20 cases where sodium bicarbonate was used the duration was 2 hours and 2 minutes. Epidural injections with procaine and bicarbonate solutions produced an average anesthesia of 1 hour and 57 minutes. Where 2 per cent procaine was used the average duration was 1 hour and 55 minutes by the epidural method. From the standpoint of the anesthetic better results were obtained by the transsacral method. The addition of sodium bicarbonate was of no advantage. The difficulty of the transsacral block made the epidural method more practical, though the height of anesthesia is invariable. Twenty-one forceps operations were done in these 90 cases. The anesthetic destroyed all desire for bearing down during contractions and this has to be counteracted by other medication. The pains of labor may be entirely controlled by blocking the second, third, fourth and fifth sacral and anococcygeal nerves. Relaxation of pelvic floor is accomplished. Operations such as forceps and repair of perineum are done painlessly. The author points out the advisability of devising a method to prolong the anesthetic action of an epidural injection for at least six or seven hours.

WM. KERWIN.

Cotte, G: Regional Anesthesia of the Uterus. La Presse Médicale, 1923, iv, p. 36.

Latarjet and Rochet have recently shown that the uterine nerve supply is divided into two groups, which join one another in the neighborhood of the isthmus. The larger and most important of these nerves arise from the hypogastric ganglion and fuse with the anterior and superior portions of the uterosacral ligaments then penetrate the uterus at the posterior and external part of the isthmus. The second group, formed by several filaments from the vaginovesical nerves, reach the organ at the inferior and anterior aspect of the isthmus. There is still another filament, the lateral nerve of the uterus, which is a little distance away from the isthmus and is distributed upon the lateral border of the organ. These investigators pointed out the feasibility of producing regional anesthesia of the uterus by blocking the bases of the broad ligaments with an anesthetic solution.

The author has adopted this suggestion in 14 cases, as follows: dilatation and curettage, 11 times; enucleation of a cervical myoma (size of a mandarin), once;

"Le Fort operation," once; pelvic neuralgia (combined with a retrorectal injection of 500 gr. of artificial serum), once. He employs the following technic: Pulling down the cervix, he injects about 10 c.c. of a 1 per cent solution of novocaine (without adrenalin) on each side of the uterine isthmus, about 0.5 cm. from its lateral border and at a depth of 1 cm.; a few c.c. are also injected into the anterior culdesac, between the bladder and the uterus, and into the posterior culdesac, in the bases of the uterosacral ligaments. The latter procedure is often very difficult. In one case he injected the solution without mishap directly into the culdesac of Douglas. Anesthesia of this area might at times be produced purposely in this manner.

The author's results have been very satisfactory, so much so that he has practically abandoned general anesthesia for curettage. He states, however, that the curettements have all been performed for the removal of placental debris, with softened cervixes; he has had no experience in dilating thick, fibrous cervixes under regional anesthesia. Careful attention to the details of the technic, and a wait of a sufficiently long interval after the injection before beginning the operation, are essential points. The author feels that for more extended vaginal work, such as hysterectomy or perineorrhaphy, low rachidian anesthesia will be preferable.

E. L. KING.

Smith, G. F. R.: Some Observations on Postanesthetic Complications. British Medical Journal, 1922, No. 3196, p. 513.

The author reports observations on 571 cases of general anesthesia. There were four deaths. One was from operative shock, one from bronchopneumonia, one from acidosis and one probably from acid intoxication. In this series were 221 major abdominal gynecologic operations, given warm ether with a small addition of chloroform. There were 220 minor vaginal operations; these were given open ether. In both series there were chest complications in 22 cases, i. e., 4.5 per cent; of these 5 were serious. The morbidity in the major operations was 7.5 per cent and in the minor 2.2 per cent. He thinks the use of the warm ether vapor accounts for the low percentage of serious pulmonary complications. Flatulency occurred in 5.4 per cent. He secured a lower percentage, (that is, 4.5 per cent) in cases prepared as follows: One ounce castor oil 36 hours prior to operation, morphine grains 1/6 and atropine grains 1/100 one hour before operation, ordinary food the preceding day, breakfast of tea and toast, one ounce of syrup of glucose one hour before operation. Vomiting occurred in 27.6 per cent of the major, and 12.7 per cent of the minor, i. e., 20.1 per cent for all cases. The change in technic as noted above increased the vomiting from 17.2 to 25.1 per cent but severe vomiting showed a decrease from 6 to 3.4 per cent.

F. L. ADAIR.

Books Received

COMBINED TEXTBOOK OF OBSTETRICS AND GYNECOLOGY. By J. M. Munro Kerr, Professor of Obstetrics and Gynecology, Glasgow University, etc., James Haig Ferguson, Gynecologist Royal Infirmary, Edinburgh, etc., James Young, Assistant Physician, Royal Maternity Hospital, Edinburgh, etc., and James Hendry, Senior Assistant to the Mairhead Professor, University of Glasgow, etc. New York, 1923. William Wood & Company.

GYNECOLOGY. By William P. Graves, Professor of Gynecology at Harvard Medical School, Surgeon-in-Chief to the Free Hospital for Women, Brookline, etc. With 388 half-tone and pen drawings by the author, and 146 microscopic drawings, with 103 of the illustrations in color. Third Edition, thoroughly revised. Philadelphia, 1923. W. B. Saunders Co.

AMERICAN ILLUSTRATED MEDICAL DICTIONARY. A new and complete dictionary of the terms used in medicine, surgery, etc. Pronunciation, derivation and definition. By W. A. Newman Dorland, A.M., M.D., F.A.C.S., etc. Twelfth edition, revised and enlarged. Philadelphia, 1923, W. B. Saunders Co.

SEWAGE TREATMENT IN THE UNITED STATES. Report on a Study of Fifteen Representative Sewage Treatment Plants. By H. H. Wagenhals, E. J. Theriault and H. B. Honmon. Prepared by direction of the Surgeon General. Washington, 1923, Government Printing Office.

ANNUAL REPORT OF SURGEON GENERAL of the Public Health Service of the United States. For the Year 1923. Washington, 1923, Government Printing Office.

TENSION ARTERIALMENTE VISCOSIDAD SANGUINEA EN OBSTETRICIA. Por Dr. Francisco A. Deluca, Prosector de la Clinica Obstetrica y Ginecologia. Buenos Aires, Imprenta Mercatali, 1923.

HANDBUCH DER KINDERHEILKUNDE. Herausgegeben von Professor Dr. M. von Pfaundler und Professor Dr. A. Schlossmann. Vier Bände mit 70 meist farbigen Tafeln und ca. 500 Textfiguren. II. Band, Dritte Auflage mit 29 Tafeln und 260 Textfiguren. Leipzig, 1923, Verlag von F. C. W. Vogel.

BIOLOGIE UND PATHOLOGIE DES WEIBES. Ein Handbuch der Frauenheilkunde und Geburtshilfe. Herausgegeben von Josef Halban, Wien, und Ludwig Seitz, Frankfurt a. M. Lieferung 2. Berlin N 24, 1923, Urban und Schwarzenberg.

HERZ UND SCHWANGERSCHAFT. Von Professor Dr. Walter Frey, Oberarzt der medizinischen Klinik in Kiel. Mit einem Geleitwort von Geh. Med. Rat Dr. W. Stoeckel in Leipzig und Professor Dr. A. Schittenhelm in Kiel. Leipzig, 1923, Verlag von Georg Thieme.

HEALTHY MOTHERS. By S. Josephine Baker, M.D., Director, Bureau of Child Hygiene, New York City, etc. Boston, 1923, Little, Brown, and Co.

HEALTHY BABIES. By S. Josephine Baker, M.D., Director, Bureau of Child Hygiene, New York City, etc. Boston, 1923, Little, Brown, and Co.

HEALTHY CHILDREN. By S. Josephine Baker, M.D., Director, Bureau of Child Hygiene, New York City, etc. Boston, 1923, Little, Brown, and Company.

HEREDITY AND EUGENICS. By R. Ruggles Gates, Ph.D., F.L.S., Professor of Botany in the University of London and Head of the Department of Botany at King's College, etc. New York, 1923, The Macmillan Co.

PRURITUS OF THE PERINEUM. (Pruritus Ani, Vulvae and Scroti). By Joseph Franklin Montague, of the Rectal Clinic, University and Bellevue Hospital Medical College, etc. With 37 Illustrations. New York, 1924, Paul B. Hoeber, Inc.

THE TOXAEMIA OF INTESTINAL OBSTRUCTION. By R. H. Paramore, F.R.C.S., Hon. Surgeon and Gynaecologist, Hospital of St. Cross, Rugby, etc. London, 1923, H. K. Lewis and Co.

Errata

In the February, 1924, issue, page 188, last paragraph, sixth line from the bottom, in the article by Dr. J. C. Applegate, the dose of morphine should read gr. 1/12 and scopolamine gr. 1/400.

The American Journal of Obstetrics and Gynecology

VOL. VII

ST. LOUIS, APRIL, 1924

No. 4

Original Communications

EXTRAPERITONEAL CESAREAN SECTION (GASTROELY- TROTOMY) IN PRESUMABLY INFECTED AND MISMAN- AGED CASES OF PROLONGED LABOR*

BY ASA B. DAVIS, M.D., F.A.C.S., NEW YORK, N. Y.

(*Medical Director, Lying-In Hospital*)

THE methods by which a child can be delivered through the abdominal wall are still passing through a period of evolution and development. Many ingenious and different plans have been and still are being attempted. Some are found to be so lacking in merit that they soon, very properly, pass on into the discard. Some show many desirable advantages and yet are attended with serious disadvantages. It is altogether probable that the best method of performing cesarean delivery has not, as yet, been attained. We hear much about the abuse of cesarean section to the exclusion of the other well-known methods of delivery. This criticism, certainly, does not apply justly to large well-conducted maternities. An abuse which we undoubtedly do witness, both in maternity hospital services and in cases under the care of private practitioners, is the failure to recognize early in given cases that delivery through the pelvis will be fraught with great danger to mother and child or else is impossible of accomplishment. If this were not true it would not have been possible for the writer to have seen, during the past March and April, within five weeks, eight cases in which craniotomy was the only thing left to be done. These eight well-developed, full-term fetuses were either already dead or so near dead that it would not have been possible to prepare an operating room quickly enough

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

to give any promise of saving these children. The result was that eight, otherwise healthy, young women, except for the disproportion between pelvis and fetus, had passed through the risks and burdens of pregnancy, had been subjected to hours upon hours of ineffective labor and delivery by craniotomy. One mother lost her life; seven others, if so many survived, were childless. In seven of these cases the dystocia was due to either a well-marked funnel or male type pelvis. The eighth had a neoplasm, so situated that it made pelvic delivery impossible. These conditions should have been recognized during pregnancy, or at the latest early in the first stage of labor. Timely cesarean section was clearly indicated and would have saved these eight children and the mother who was lost. This is not a cry along a new trail. To go back not more than some seventy odd years, Cazeau, with rare comprehensive insight, pointed out the danger and objections to prolonged ineffective labor, especially with membranes ruptured. Nearly every textbook on obstetrics since his time reiterates the same thing, until we might properly write into obstetric history: "As it was in the beginning, is now"—Are we to continue so that the remainder of the quotation, "and ever shall be, world without end," is to be applicable?

Autopsies at the Lying-in Hospital upon stillborn infants and upon those who die soon after birth are revealing some instructive, if unpleasant, facts. It is found that the number of these children who die from cerebral hemorrhage, after unduly long labors which are eventually either terminated spontaneously or by forceps or version, is unwarrantably large. Similar cases, which have been under the care of private physicians have been admitted to the hospital after long labors, unknown attempts at operative delivery and examinations, but with a living child in fair to good condition. It is this type of case which gives the high maternal and fetal mortality following cesarean section. It is this type of case, with disproportion between fetus and pelvis, long labor, with ruptured membranes, unclean examination, unsuccessful attempts at operative delivery, which has made it impossible for me, in an experience of more than twenty-three years and somewhat over five hundred and eighty cesarean deliveries, to reduce my maternal mortality much below eight per cent, although at one time I could show nearly one hundred consecutive cesarean sections without a maternal death. The different members of the attending staff at the Lying-in Hospital, as seems best to each one, are attempting to cope with the presumably infected case, by a technic other than the classical cesarean section, which gives a very high mortality. Some favor the transperitoneal method, some the so-called double flap method; some a technic which is near or quite extraperitoneal.

I have employed the double flap teehnice in three eases and have lost one mother and her child. This mother gave one of the most

In 1918 I began to employ, for these presumably septic, unfavorable observation.

In 1918 I began to employ, for these presumably septic, unfavorable cases, practically the technic of Thomas, which the latter called "gastroelytrotomy." I have used it in twenty-eight eases and have lost two mothers and seven children, three of which were stillborn and four died after delivery—a maternal mortality of 7.2 per cent, fetal mortality, 25 per cent.

Without any attempt at a review of the literature upon this subject, it may not be amiss to quote rather freely from what is found in the Fourth Ameriean Edition of Playfair's System of Midwifery, published in 1885, under the title, laparoelytrotomy. We learn that in 1820 Ritgen proposed laperoelytrotomy, leaving the peritoneum intaet. He attempted such an operation unsuecessfully and was obliged to deliver his patient by caesarean section. In 1823 Beaulocque the younger independently eoneeived and performed the same operation without success. In 1837 Sir Charles Bell conceived a similar operation, but there is no mention of his ever having performed it.

In 1870, Dr. T. Gaillard Thomas of New York read a paper before the Medical Assoeiation of the town of Yonkers, New York, entitled "Gastroelytrotomy, A Substitute For Cesarean Section," in which he described the operation which he had performed three times on dead subjects and once on a married woman with a successful issue as regards the child. It is further stated: "The object of the operation is to reach the eervix by incision through the lower part of the abdominal wall and upper part of the vagina, and through it extract the fetus as may most easily be done."

In a footnote we read as follows: "New York Medieal Journal, Nov., 1878, Thomas operated twice, Skene four times, Charles Jewett of Brooklyn twice; Hime, Edis, Dandridge and Taylor of Cineinnati, and Walter R. Gillet of New York each onee, in all 12; women saved, 6; children living but not moribund, 7; bladder lacerated in 6 eases. In properly ealeulating the risk of the operation it is fair to exelude the moribund case of Thomas, the intemperate and bedridden ease of Hime and the diseased subject of Edis who survived, respectively, one hour, two hours and forty hours. The balanee, nine eases, were favorable in four instanees and unfavorable in five; six of the nine women recovered and five children were saved."

We may note in passing that while this operation is a much more diffieult one to perform, the above results were far better than those obtained at that time by abdominal eesarean section.

THE THOMAS TECHNIC

"The abdominal incision extends from a point an inch above the anterior superior iliac spine, and is carried, with a slight downward curve, parallel to Poupart's ligament until it reaches a point one inch and three quarters above, and to the outside of, the spine of the pubes. Beyond this point it must not extend, in order to avoid wounding the round ligament and the epigastric artery. In this incision the skin, the aponeurosis of the external oblique, and the fibers of the internal oblique and the transversalis muscles are divided. The rectus is not implicated. After the transversalis fascia is divided the peritoneum is reached and readily lifted up intact, so as to expose the upper part of the vagina, through which the fetus is extracted." This report continues at considerable length in its description of the anatomic relations and development of the upper part of the vagina during late pregnancy and the difficulties and dangers attendant upon opening it—stating that in Beaudelocque's case, because he incised instead of tearing the vagina he was obliged to discontinue the operation on account of the loss of blood.

While the technic employed in operating upon the cases which I report is in principle, based on the foregoing as described by Dr. Thomas, it differs from it, I believe, in some essential particulars and results.

PRESENT TECHNIC

Starting at a point on a level with, and about 2 cm. to the left of, the right superior iliac spine an incision down to the aponeurosis of the external oblique muscle is extended obliquely downward and inward to the middle line parallel to, and slightly above, Poupart's ligament, the inner end being slightly above the spine of the pubes. As the superficial epigastric artery and other vessels come into view they are double clamped, divided and ligated. It has been found that this is a time saving precaution, in that it keeps the field of operation clear. The edges of the wound are retracted and in succession the remaining layers of the abdominal wall are divided, where possible separating the fibers. The transversalis fascia is opened the whole length of the wound. Passing the hand close to the posterior surface of the front wall of the bony pelvis the bulging peritoneum can be readily lifted, and, covered with a pad moistened in warm salt solution, is held out of the way in the upper and outer part of the wound by a retractor. No attempt is made to expose or open the vagina, although it is sometimes opened for a short distance in cases where more room is needed. The bladder is more readily manipulated if it contains just enough fluid to give it outline. With a boring movement of the fingers at the upper and right margin of the exposed portion of the bladder, its posterior wall is readily reached and an easy line of cleavage is found. Passing the fingers up to the uterovesical fold the bladder can readily be freed from above downward and to the left. This exposes the anterior portion of the lower uterine segment, a large area in a pregnant uterus developed to full term. While a wound of the size and location as described is necessary, it is well, in so far as possible, to keep manipulations away from the outer end of the opening. In my hands, failure to do this has several times resulted in such complications as making a small opening through the peritoneum, tearing across the circumflex iliac artery, resulting in annoying delay from a wound quickly filled with blood, and the necessity to find and ligate the bleeding point, and the undue exposure to injury of the external iliac artery.

Considerably more room can be gained by partially dividing the tendon of the right rectus and the pyramidalis muscles rather close to the right pubic

spine. The bladder is covered with a moist pad and retracted downward and to the left. The exposed portion of the uterus is thinned and bulged forward by the presenting part of the fetus. Retracting the wound as far as possible to the left a vertical incision is made close to the left side of the abdominal opening and from below the uterovesical fold downward far enough to furnish an opening sufficiently large to allow the delivery of the fetus. Sometimes, but not in all cases, this opening extends into the upper part of the vagina. At this time it is well to take a culture from beside the presenting part of the child. By this location of the uterine opening as described, and by the usual dextro-torsion of the uterus, should this opening be extended by laceration during the delivery of the fetus, there is less likelihood that the uterine artery will be reached and torn across. In my earlier operations this accident happened in several cases. Proceeding now with the delivery;—forceps were usually applied, but except in two or three instances delivery has proved unsuccessful by this means. Nearly all of the children have been delivered by internal podalic version and breech extraction, followed immediately by manual extraction of the placenta and membranes. Unless more than usual precautions are observed, the overstrained but now relaxed uterus is more than likely to give an exhibition of several quick profuse hemorrhages in which the total loss of blood is considerable. The fundus should be promptly held and 1 c.c. of pituitary extract should be injected deep into the muscles of the thigh. From observation and experience I have reached the confirmed belief that pituitary extract should have no place in obstetric practice until the uterus is empty. In case a portion of the vagina is opened and annoying bleeding results from the cut edges, this can be overcome by digital compression or by several deep temporary sutures passed parallel to, but well back from, the edges of the wound, to be removed after permanent closure.

The opening in the uterus is closed by two or three layers of sutures with a continuous suture close to the deep edges of the uterine wall. Several interrupted sutures and a continuous Lambert suture complete this part of the operation. Sometimes the uterus has so thinned that it is difficult to find room for three layers. The bladder and peritoneum are allowed to resume their normal location.

The divided portion of the tendon of the right rectus and the pyramidalis muscle are carefully approximated and secured by several interrupted chromic sutures. A continuous suture closes the transversalis fascia; another layer of interrupted sutures secures the muscle fibers. The edges of the aponeurosis of the external oblique muscle are overlapped by the use of the mattress sutures and the free edge secured by a continuous suture. The remainder of the wound is closed with silkworm gut sutures. In earlier cases I employed strands of chromic gut or rubber tissue carried down to the fascia. Soon I abandoned the use of any drains. No better results were obtained with than without drainage.

It should be borne in mind that all of the cases herewith reported were septic to a greater or less degree. All of these cases had high temperatures after operation. In no case was it possible to secure primary union of the abdominal wound. Two showed only an oily discharge for a day or two from two or three stitch holes. In twenty-one cases, part, or the whole length of the wound separated down to the aponeurosis. In four cases the whole depth of the wound broke down with considerable sloughing. Two patients died early before the repair process had time to exhibit what would have hap-

pened. The wounds healed readily, and in all cases the infection remained local, with the exception of two or three cases in which there was mild tenderness down the inner part of the right thigh, as of a very slight phlebitis. I have had no evidence that the uterus was infected, or that its wound failed to unite by primary union. In a few of the cases there must have been a very localized peritonitis. With the exception of one case, either by symptoms or leakage, there has never been any suggestion that the bladder had been injured or later became infected. One case which sloughed badly had a vesical fistula for a short time, which soon closed spontaneously.

It is not surprising that considerable fat necrosis occurred in many of the cases from traumatism due to retraction. Because of open wounds the stay in the hospital was usually quite prolonged. In four cases, we freshened the granulating surfaces and the skin edges, and resutured the wound after sloughing had ceased. Healing was almost perfect in every case and the necessary stay in the hospital was considerably shortened. All of these patients were tired out and exhausted.

The operation is physically and technically a very difficult one to perform. In early cases, I spent something over two hours, later being able to perform this operation in about fifty-five minutes. Much time was lost because of the failure to secure bleeding points before or at once after vessels were cut. Very much more time was lost before I learned how to detach the peritoneum and also in the attempt to detach and separate the bladder along its right side, where the line of cleavage is not distinct. Notwithstanding the previous condition of these patients, and the fact that they were subjected to a long difficult operation, their early postoperative condition was remarkably good. Vomiting was never a distressing symptom, and abdominal distension was almost entirely absent.

In Dr. Thomas' report, considerable stress is laid upon the danger of injuring the deep epigastric artery. From early reports, opening into the bladder was rather a common accident. I cannot recall that the deep epigastric artery ever came into view or was injured in any of the cases. In one case only there appeared a urinary fistula. This became evident after the tenth day postoperative, and was believed to have been due to the neighboring sloughing. In two cases the right round ligament, and in one, the right ureter, were innocently in evidence. They caused no inconvenience, and so far as I was able to determine they suffered no injury. Usually the widely expanded pregnant uterus tends to carry these structures far out to the sides and out of the way.

Some of the more salient points of interest in connection with these cases are that there were sixteen primiparae, one para ii, five para

iii, one para iv, one para v, one para vi, two para vii, and one para viii. The ages ranged from seventeen to forty-one. Twelve of these cases were wholly under the care of the Lying-in Hospital. The remaining sixteen had been under the care of other physicians and midwives for an unknown number of hours. Of the two mothers who died, one was forty-one years of age, and a para viii. She had been under the care of an outside physician, and a midwife. She gave a history of having had three living children. The first was stillborn; an instrumental delivery. The others were difficult deliveries. The second was a small sized child, the third was a large child, the fourth of medium size and difficult delivery. She had also had three abortions in the third month of pregnancy. In the labor under consideration the child weighed 4,160 grams and lived. The mother died on the second day, of general peritonitis. There was serosanguineous fluid in the peritoneal cavity and cultures showed hemolytic streptococci. This woman had a contracted pelvis, and reported that all of the living children had been injured by the stretching of the brachial plexus.

The other patient who died was twenty-seven years old, a para i, who had had outside medical attendance for an unknown number of hours before admission. A forceps delivery had been attempted. The patient gave a history of having had pneumonia three weeks before labor. Her child weighed 2,020 grams and lived. She was in poor condition on admission, and it was my impression that the cause of her death was pneumonia plus labor, rather than the reverse. No culture was taken in this case.

In all of the twenty-eight cases reported the fetal heart was heard just before operation was begun. Three babies were stillborn. In these cases there was marked tonic contraction of the uterus, and evidence of fetal distress as indicated by the escape of meconium and a varying fetal heart. In one of these stillbirths, the mother was a girl of seventeen years, who had been under the care of an outside physician, and a midwife. Hydrocephalus and spina bifida were found in the child. It was a face presentation.

Four babies died. One child died after four and a half days; another on the nineteenth day from a very extensive pemphigus. The mother in this case showed a four plus Wassermann reaction. The third child weighed 4,870 grams and died on the labor day; the autopsy showed atelectasis and asphyxia. The patient had been in labor for a long while prior to admission to hospital. The fetal heart was from 140 to 180 prior to operation. In the case of the fourth child, labor was said to have been in progress for three and a half days under outside care. The child weighed 3,400 grams, and died six hours after delivery.

All of the cases wholly under the care of the Lying-in Hospital, with trial labor going on for so long a time, and in some instances attempted forceps delivery, had been for this reason rendered unsuitable cases for classical cesarean section. All of these mothers survived. A stillbirth occurred in one case after sixteen hours' labor. One child died on the nineteenth day from pemphigus; the mother was syphilitic.

Six of these patients in a subsequent pregnancy have come under my care. One in the third month, when assured that she was pregnant, declared that her husband demanded that she should have abortion induced. Nothing further has been learned about her. The other five continued to the full term of pregnancy. One had an almost precipitate spontaneous delivery of a very small child. Four others were delivered by me, by classical cesarean section. Bimanually, with one hand through the cesarean opening in the uterus, the site of the former extraperitoneal operation was carefully examined in each case. It was rather surprising to find how well the uterine wall had closed and how little in evidence were adhesions in the neighborhood. In no instance was there found any weakening or hernia at the site of the former opening in the abdominal wall.

I am more and more impressed with the importance of securing the essential points in the history of every pregnant woman. The primiparous patient is an unknown quantity, obstetrically speaking, but in her case it is important to learn whether she has any history of disease, previous illness, or operations, which may have some bearing upon the course of her pregnancy and approaching confinement. This likewise holds true of the multiparous women, but also a searching inquiry should be made into her previous obstetric history. In women who are able to develop a fetus through pregnancy and into labor, with our present knowledge and equipment it should be impossible to find histories of two, three, four, and in one of our cases, of five consecutive stillbirths or the delivery of injured children who soon die, and certain others who are not so fortunate as to die, but are elected, because of birth injuries, to materially swell the ranks of the incompetent and to overcrowd institutions for the crippled and feeble minded. Patients giving histories of difficult or operative deliveries with bad results should be examined as to the cause of this. They should be watched with unusual care in each individual case. Some means should be found by which the previous course should not be repeated, even delivery by cesarean section if that is the best procedure in a given case. But the condition should be foreseen and provided for.

After the patient's history has been taken there should be a general examination sufficiently thorough to indicate whether she is suffering

from pulmonary or cardiac disease. Then should follow the routine obstetric examinations, which should include height, weight, breasts and nipples, abdominal measurements, palpation, and auscultation for the fetal heart, external and internal pelvimetry, blood pressure, urinalysis and the Wassermann test. I find that about 2 per cent of all applicants at the Lying-In Hospital, show a positive Wassermann reaction.

Pelvimetry is important and should in no sense be neglected. Patients having contracted pelves, should be under careful observation. If they are given the opportunity and the observation be close enough, we shall see that a large proportion of such cases will deliver themselves without assistance, or at most, by the aid of easy forceps. The remainder of such cases have either declared themselves by their former history, or they soon make it evident that they require some form of operative assistance—forceps, version or cesarean section. Many of the patients with distorted and contracted pelves habitually give birth to small children; often the skull bones are thin and capable of being dented like a sheet of celluloid; they have wide suture spaces; the fontanelles are large. Such heads will mold and pass through surprisingly contracted pelves. In former times we were instructed: Given such and such pelvic measurements, such and such management of a case should be carried out.

We still see, from time to time, publications giving this same sort of advice. The wise obstetrician will do nothing of the sort. He will take pelvic measurements as he would a laboratory report as a part of the data in the individual case under observation at the time, and from the previous history, from the measurements, from the contour, muscular make-up of the uterus and abdomen and their driving force, and above all from the size, shape and moldability of the fetal head, he will decide whether that particular head will pass through that particular pelvis. If his stock of wisdom still holds out and he considers the interest of mother and child and his own peace of mind, he will determine this fairly early, before the patient is exhausted and the fetus shows signs of distress, and the liability to infection has been increased by ruptured membranes and manipulations. It is becoming fairly easy to detect these cases with contracted pelves, or disproportion between pelvis and vertex, which will require some form of operative assistance in delivery. It has seemed to me that this type is rather decreasing in numbers.

There is another distinct type, seen much more frequently than formerly, and far too little called to notice by teachers and writers. I refer to the woman having the male type or funnel pelvis. They are difficult to detect and they require the keenest kind of obstetric judgment and skill to carry a given case of this kind through labor with safety and success for mother and child. Here pelvimetry gives no assistance whatever. These patients are usually of medium height, stocky build, with apparently broad hips. They have

the appearance of robust health and vigor. They are well nourished, buttocks and hips especially are made up chiefly of large cushions of fat. Their external pelvic measurements are up to or above normal. The lumbosacral angle is accentuated. A horizontal plane passing through the promontory and another through the symphysis pubes are far apart. The pelvic bones are thick and strong. The pubic arch may or may not be narrowed. The internal, diagonal conjugate, if the promontory can be reached, not infrequently measures twelve or more centimeters. Sometimes the contour of the pelvis below the inlet is well formed and of ample capacity. In other cases one or both of the side walls of the true pelvis are flat and tend to converge. The pelvic inlet would be ample for an ordinary moldable vertex, and in many of the cases, if a large part of the vertex would pass through the inlet with a fully dilated cervix, there would be comparatively little difficulty in completing pelvic delivery. But the pelvic make-up and capacity is but one side of the equation. Such patients habitually give birth to large children with hard, square block-like heads, with thick dense cranial bones and suture lines and fontanelles which are hardly discernable. Membranes are apt to rupture before or soon after the onset of labor. Posterior positions are rather frequent. Such cases are deceptive because a considerable segment of the vertex sets into the inlet like a ball valve; it does not advance. Such dilatation and thinning of the cervix as takes place is slow. In many cases labor is neither continuous nor vigorous. One is apt to be misled by the hope that active progressive labor will soon begin resulting in dilatation of the cervix and advance on the head. Such cases are apt to develop tonic contraction of the uterus and thin out the lower uterine segment, risking rupture of the uterus, compressing the vertex down against the inlet and the placenta against the child. As if this were not danger enough, far too many of these cases are given pituitrin at this stage. It would be bad practice to give ergot under such conditions, but pituitrin, which acts with great suddenness and force within four minutes after its injection, as I have repeatedly witnessed in cesarean operations, after the uterus was empty, by some strange reasoning, in the minds of not a few, appears to be good treatment. These cases are difficult and dangerous for mother and child; they belong in a hospital. They certainly should not be attempted single-handed and alone in the patient's home. In many of them if pelvic delivery, dilatation and incisions of cervix and forceps are persisted in, the operator does not usually look upon his completed work with pride. If version is attempted, too often the results are not good. Many of them become unsafe, because of the risk of sepsis, for classical cesarean section, unless this is done early. This type of case gives the high percentage of stillbirths, cerebral hemorrhage, broken necks, children in whom the heart continues to beat for an hour more or less, and yet it is impossible to start respiration, or

those who die soon after birth. Would it not be better to foresee some of this early and "abuse" cesarean section in more of these cases and do it early when it is comparatively safe for mother and child? If the mothers are made to understand, there is no doubt regarding the answer which they will give.

RÉSUMÉ AND CONCLUSIONS

1. The sooner the general public, both lay and medical, come to the realization that reproduction is potentially, and in ten per cent of the cases, actually a pathologic process, and act accordingly, the sooner childbed will be removed from the position which it now holds in this country as, next to tuberculosis, the cause of the greatest number of deaths.

2. Every pregnant woman should be under competent obstetric care and instruction soon after conception, through gestation, labor and the puerperium, which should continue until everything possible has been done to restore her to her normal activities of life in good condition. Ninety per cent of pregnant women should be under careful observation, but aside from a few simple precautions and instructions, as long as they are progressing favorably, should be treated to a very generous share of masterful letting alone. It should always be kept in mind that some from this larger class have a way of moving, gradually or abruptly over into the abnormal class.

3. The emergency obstetric case should disappear. It is this type of case which magnifies the morbidity and mortality of obstetric records. So long as such cases do occur, the well equipped maternity hospital should receive them, even though they are apparently about to die. With such aid, some of the seemingly hopeless cases will recover. There should be some way of checking up the activities of the doctor who is repeatedly showing bad results. Such an one should be rather actively encouraged to direct his energies along less dangerous lines.

4. We can often see more by looking backward. We would accomplish more, with better results, by looking ahead. Preventive obstetrics should be a widely broadcasted slogan. The public should be taught to be more critical of obstetric result, and not to so complacently accept dreadful injuries to mother and child, or death of one or both, as the Will of an overworked Providence. Extraperitoneal cesarean section will save some lives that would otherwise be lost. Classical cesarean would have saved but few of the cases reported.

IS CESAREAN SECTION JUSTIFIABLE IN ABLATIO PLACENTAE?*

BY JOHN OSBORN POLAK, M.D., F.A.C.S., BROOKLYN, NEW YORK.

(From the Clinic of the Long Island College Hospital, Department of Obstetrics and Gynecology)

PREMATURE separation or ablatio placentae (Holmes) is the partial or complete separation of the placenta from the upper segment of the uterus during pregnancy or during labor, before completion of the second stage, due to some pathologic state of the uteroplacental union, or to violence done to the organ.

In my experience, premature separation of the normally implanted placenta is perhaps the most frequent cause of antepartum bleeding at or near term; and it is an accident which all of us should be prepared to recognize and treat along rational lines; for but few cases require radical interference, but all need intelligent supervision.

The frequency of ablatio has been estimated as about 1 in 200 labors; however, I am under the impression that many cases of partial separation with concealed hemorrhage are missed, owing to careless observation, and that many of the cases that are diagnosed as partial placenta previa, because of the occurrence of bleeding, near term or during labor, are really premature separation.

In our clinic where every placenta is carefully examined, we have been surprised to find how many placentae have old blood clots on the maternal surface; hence we have come to feel that ablatio is seen more frequently than placenta previa. The factors which seem to predispose to this accident are age, multiparity, advanced period of pregnancy, and the unstable attachment of the placenta due to the physiologic structure of the serotina at, or near term.

Upon reviewing my cases I found that the majority of these accidents have occurred in women between 25 and 35 years of age, who have had an *antepartum history of toxemia*; while the minority have shown evidences of deciduitis or placentitis with hemorrhages in the serotina, and but a few could be attributed to direct violence, as blows, kicks or sudden muscular exertion.

The point and degree of separation have considerable bearing on the amount of blood which the patient loses and the severity of her symptoms: consequently they must also have some bearing on the prognosis and form of treatment which should be instituted.

As I have already stated, the normally situated placenta may become

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 10-21, 1923.

(1) partially or (2) completely separated from its placental site. If the former, the separation may be central (Fig. 1), the placenta remaining attached at its circumference, which allows the formations of a retro-placental blood accumulation. This stimulates contractions which in turn compress the clot and further separate the placenta from its attachment, so that one edge may separate and the escaping blood strip the membranes from their uterine adhesion.

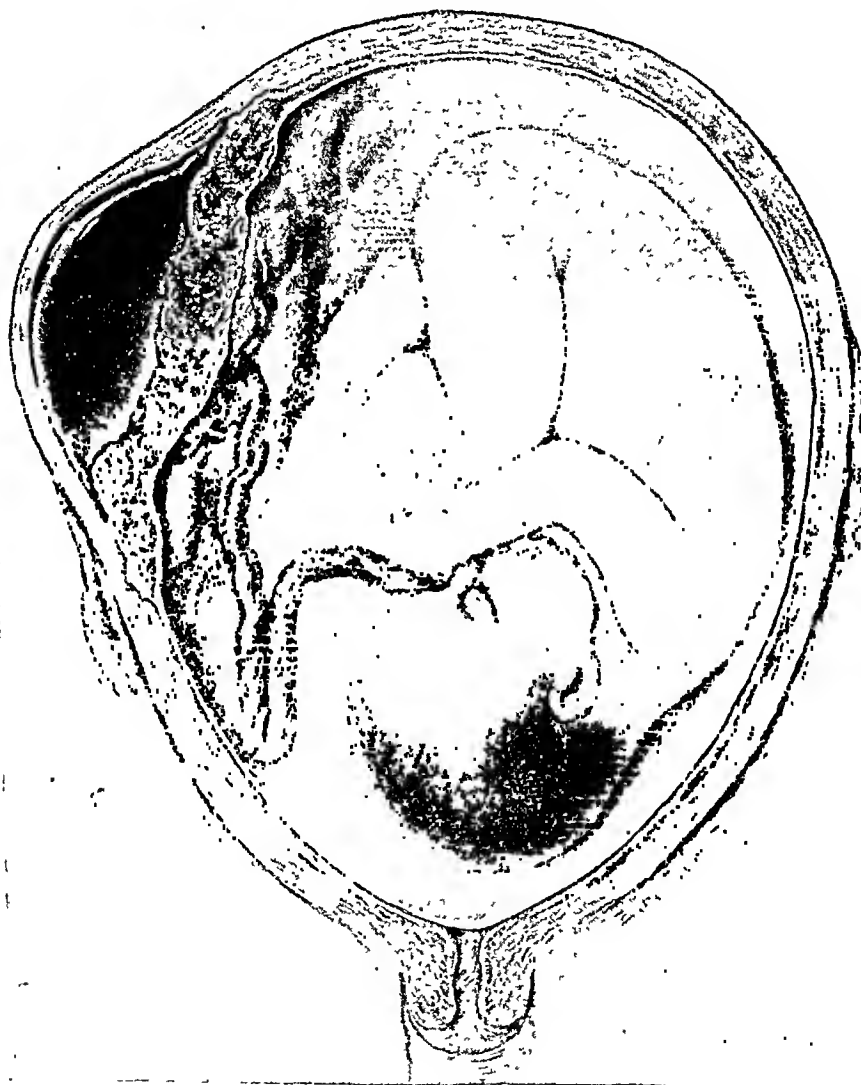


Fig. 1.—Central separation. Concealed hemorrhage.

It may be stated that *all cases begin with absolute concealment of the hemorrhage* and later, may develop an apparent hemorrhage; for as the membranes are detached from the lower uterine segment, there may be an apparent hemorrhage when the presenting part does not completely block the lower segment (Fig. 2), blood and clots escaping at the time of contractions, or the blood may remain concealed if the presenting-part is engaged, and completely blocks the cervix. In this

case blood can be demonstrated by the escape of serum, blood, or clots, when the presenting-part is displaced upward on vaginal examination (Fig. 3). When the separation is complete, the accumulation may rapidly distend the uterus; for the placental site in an over-distended spastic uterus cannot retract unless the membranes are

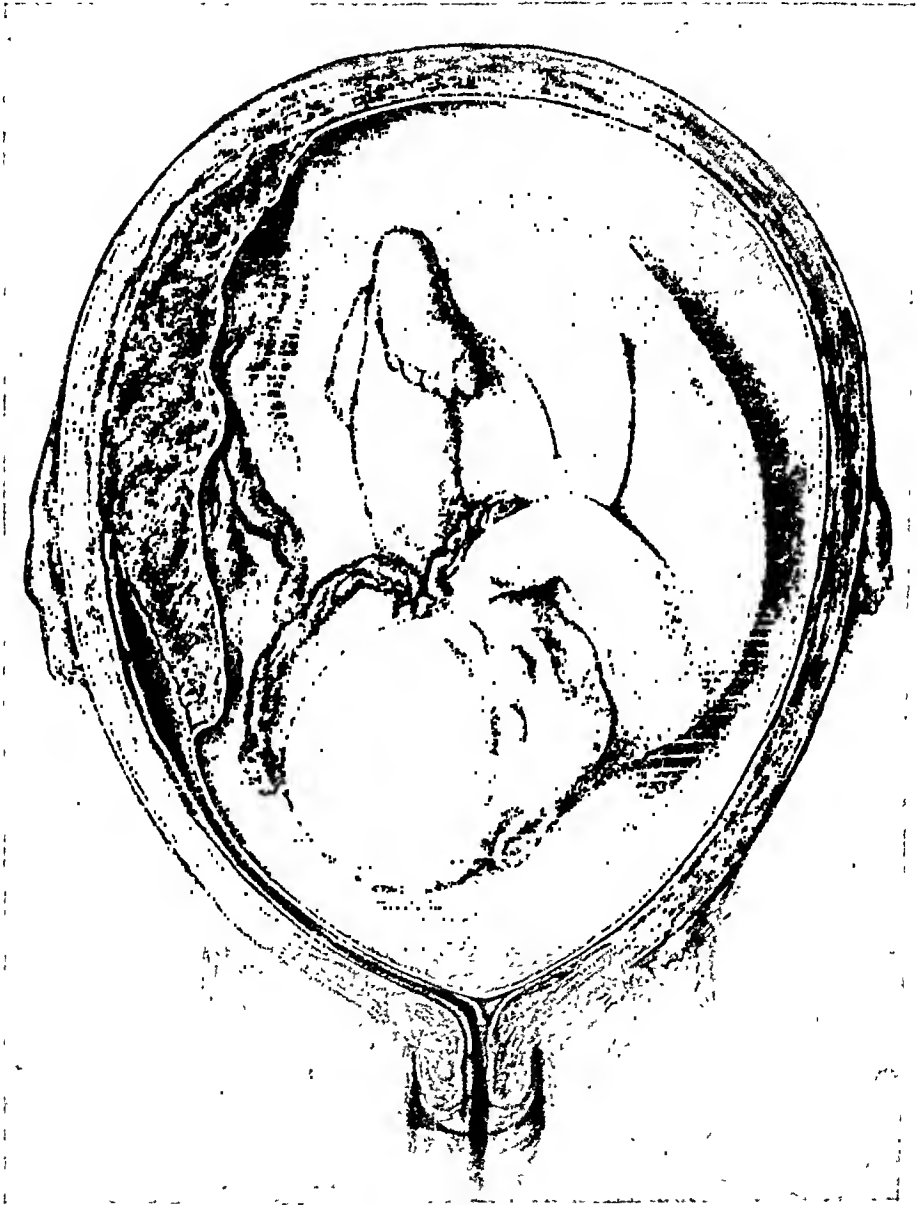


Fig. 2.—Apparent hemorrhage, partial separation. Head unengaged.

ruptured soon after the separation takes place, for the increased intra-uterine bulk prevents thickening of the uterine walls by normal retraction.

While pathologically there seem to be two types—the one (Fig. 4) with concealed, and the other with apparent bleeding—this difference is only relative, or one of degree.

The diagnosis should be readily made upon the symptom complex, which is almost always present. The patient, an old primipara, or a multipara, usually at, or near term, who may have shown some of the prodromal signs of toxemia (such as a trace of albumin in the urine, or a rise in the systolic blood pressure, or these signs may have been absent)

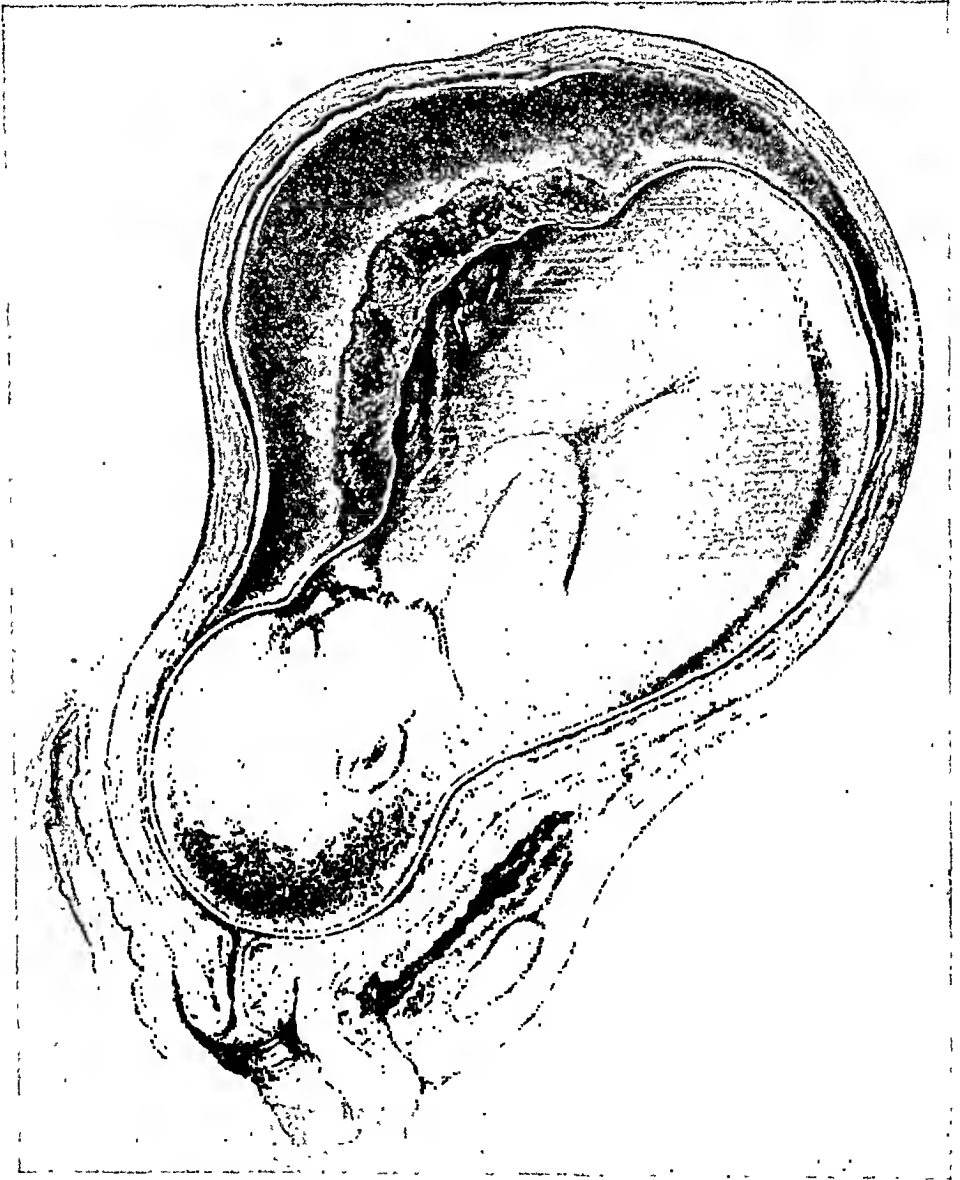


Fig. 3.—Head filling lower uterine segment, preventing escape of blood.

is suddenly seized with cramp-like uterine pain, which may be localized and referred to the placental site, faintness, or nausea, which is always attended with some degree of shock, blanching, and pulse rise. Palpation shows a uterus that is extremely sensitive, spastic, tense and firm, or flaccidly filled with retained blood which does not intermittently contract and relax, as in normal labor. The fetal movements may be tumultuous and then cease, depending on the degree of separation.

Owing to the spasticity of the uterus, detection of the fetal parts is difficult. Auscultation will show the fetal heart to be absent if the ablatio is complete, or if the separation is incomplete there will be progressive signs of impairment in the fetoplacental circulation—of course

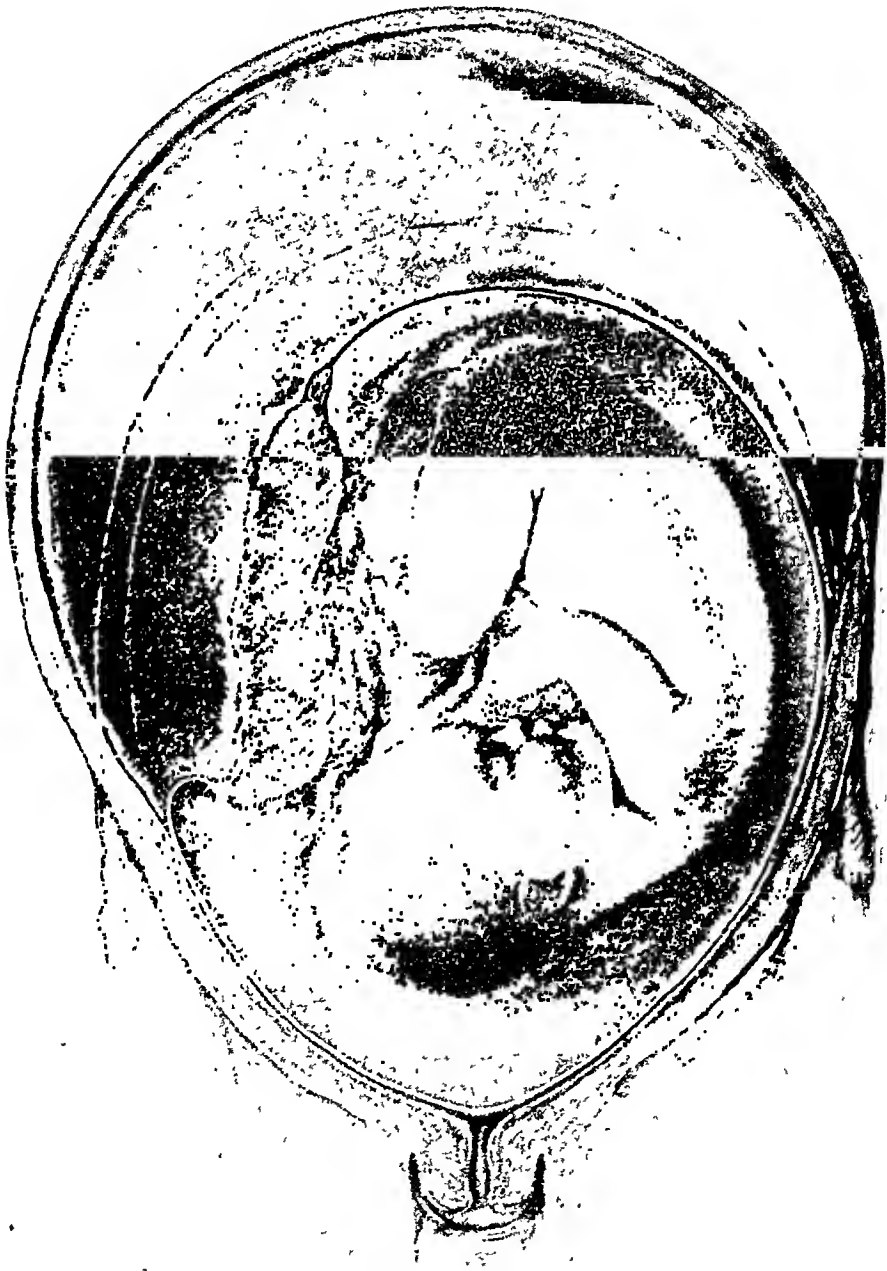


Fig. 4.—Complete separation—distended, atonic uterine wall becoming thinner.

both the fetal movements and the changes in the heart sounds are dependent on the amount of separation.

The diagnosis is confirmed in both the relatively concealed, and in the apparent cases by the escape of bloody serum, or by actual vaginal

hemorrhage. In the relatively concealed cases, on raising the presenting-part out of the pelvis, it is usual for some of the accumulated blood and clots to escape into the vagina, while palpation and mensuration will demonstrate the asymmetry, or the rapid enlargement of the uterus (Fig. 5).

It is my purpose, in this short communication to outline the obstetric procedures indicated in the management of this accident, for like ectopic, the cases may be divided into those in the nontragic, and those in the tragic stages.

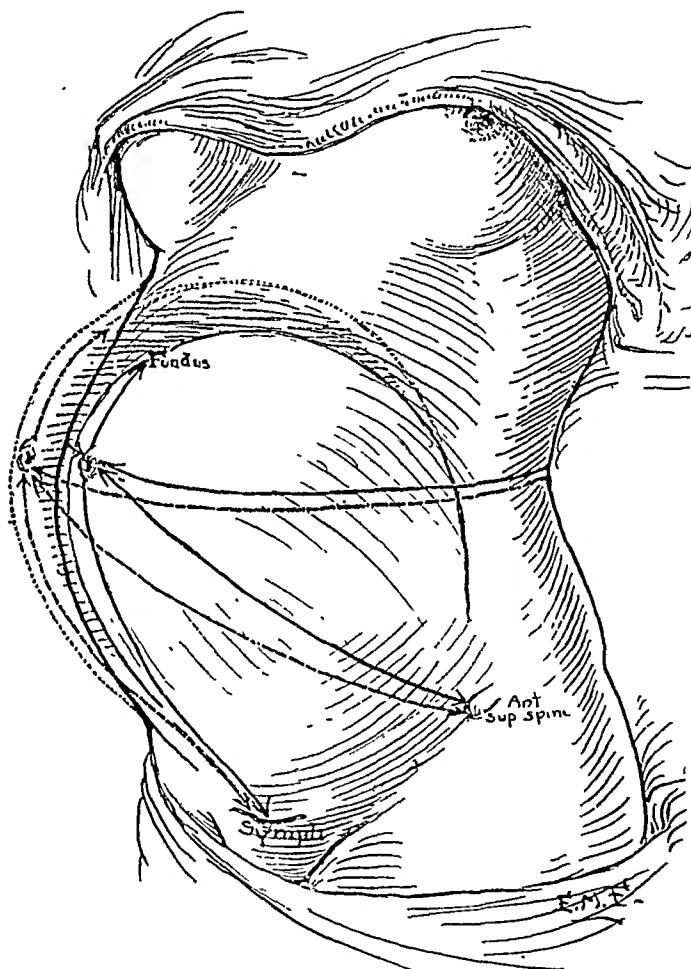


Fig. 5.—Mensuration showing the rapid increase in size of uterus with retained blood.

Clinical study of a large number of these cases has shown that it is possible to differentiate between those that can be safely treated on the expectant plan, and those that require rapid infrapelvic delivery, or section and hysterectomy. The treatment depends largely on the extent of the pathology, and while today, in many instances of separation, there seems to be irrefutable evidence of an associated toxemia, there are others which cannot be attributed to this cause.

Morse's observations confirmed by his experimental work on rabbits, in which he tied all three groups of the efferent veins of the uterus on

one side, seem to prove that the exciting cause of many of these separations may be attributed to placental apoplexy produced by sudden uterine torsion which interferes with the out-going blood. One has but to remember the picture of the uterine veins of the pregnant uterus when

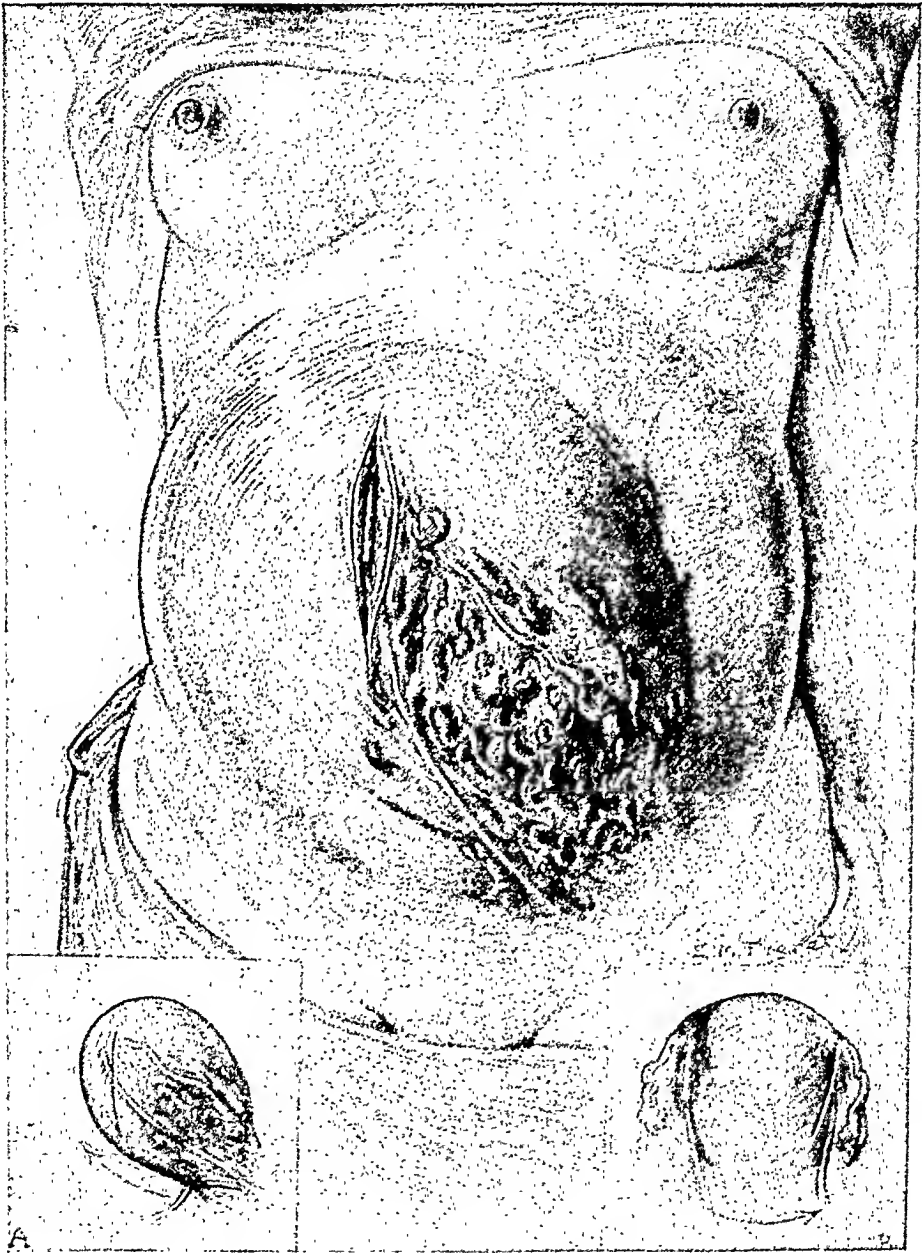


Fig. 6.—Extreme torsion of uterus.

the abdomen is opened at section, to realize how increased torsion of the uterus, near term, may block the venous return on one side (Fig. 6), and engorge the mesometrie veins, the intervillus spaces and the decidual radials. This torsion when it is greater than normal may be further increased by muscular effort or by uterine contractions of the torsioned uterus. This naturally further engorges the large veins on one side,

and engorges the vessels in the serotina which act exactly as does retraction of the uterus during the third stage of labor, namely, allows hemorrhagic extravasations to take place at many points in the spongy layer of the decidua which during contraction further separate placental attachment in the so-called concealed type. Owing to the fact that the placental site cannot retract because of the bulk of the uterine content, the area behind the placenta becomes distended with blood, fluctuant then spastic and very tender. If the placenta completely separates, retraction of the site may not take place as long as the uterine content prevents diminution in the size of the uterus. Consequently, instead of the uterine wall thickening, the walls become thinner and more atonic as the bleeding from the placental site continues and the blood accumulates in the space between the membranes and the uterine walls, always increasing the size of the uterus; hence, continued intrauterine bleeding may be demonstrated clinically by repeated mensuration of the uterus, record of the rising pulse rate, persistent fall in the systolic blood pressure, and progressive drop in the hemoglobin percentage. While objectively the patient continues to show more pallor and other external evidences of internal hemorrhage, such a picture does not brook expectancy, but needs prompt surgical intervention with coincident blood transfusion.

On the other hand, the nontragic cases likewise present a typical syndrome which may be readily recognized i. e., a pregnant woman at, or near term, who after exertion, or without appreciable muscular effort, except perhaps a few uterine contractions, is seized with cramp-like uterine pain, slight collapse evidenced by nausea, pallor with perspiration about the lips, nose and forehead, lowering of the blood pressure, and increased pulse rate. On physical examination the uterus will be found to be tense and tender, and may be asymmetrical if the blood has accumulated behind the placenta (accessory tumor) or with the occurrence of pain, vaginal bleeding may be apparent, or only be demonstrated on making a vaginal examination and raising the presenting-part which liberates some accumulated blood clots.

Given a patient presenting the foregoing picture, and excluding placenta previa by the absence of its physical signs, a diagnosis of ablatio placentae may be readily made. Such a patient should be immediately transferred to the hospital and allowed a short period of intelligent observation. If the cervix is effaced, or the patient is a multipara, the membranes may be ruptured and the bulk of the uterine contents diminished. This theoretically allows the fetus to act as an intrauterine tampon which stimulates muscular contraction. A quarter to a half a grain of morphine is administered to relieve the shock and aid in the dilatation, while a tight many tailed abdominal binder is applied from above downward in order to firmly compress the uterine wall against the fetal tampon. In addition to this, the vagina may be firmly

plugged with sterile gauze or cotton moistened with boroglycerid which further stimulates uterine contractions and favors dilatation.

If it is certain that the pelvic measurements at the outlet are ample, the presenting-part is engaged, and there is already evident dilatation of the cervix, the suggestion of Tweedy, of giving small repeated doses of pituitary extract every 20 minutes, will further aid the control of bleeding.

During this watching period intelligent observation is imperative. The pulse should be taken and recorded every fifteen minutes, the systolic pressure every half hour, and the hemoglobin and red cell count every hour, while the height and size of the uterus which has been carefully marked out upon the abdomen, should be noted and any increase in uterine distension recorded. If these measures check the hemorrhage, as they usually do in the majority of cases, the pulse will gradually improve in quality and become slower, the systolic pressure will rise or remain stationary, and there will be no further fall in the hemoglobin percentage until delivery occurs and the placenta is expelled. If, however, the pulse rate is high, I have found it wise to firmly pack the interior of the uterus with washed iodoform gauze and thus control further oozing.

On the other hand, if the intrauterine bleeding is continuing, the uterus will further enlarge, or the outward flow of blood will not be checked. It must be remembered however, that the amount of vaginal bleeding is no index of the amount of blood lost; for more or less blood is always retained within the uterus. The pulse increases in rapidity and diminishes in quality, while the systolic pressure will slowly fall as will also the percentage of hemoglobin.

In those patients, in whom the clinical picture above described, show the signs of progressive intrauterine bleeding, no infravaginal method of delivery is justifiable unless the cervix is already dilated. For one is dealing not only with the atonic uterus, but with an organ whose musculature presents definite pathology, namely, an apoplectic uterus with blood extravasations into the myometrium causing disassociation of the muscle fibers making it impossible to secure retraction, and hence postpartum hemorrhage is the sequel (Fig. 8). Furthermore, the release of the large quantity of retained blood which immediately follows delivery of the fetus, is always attended with severe shock, for the rapid emptying of the overdistended atonic uterine cavity does not permit of retraction, hence, the frequency of fatal collapse. I formerly delivered these patients by manual cervical dilatation, forceps and version, and saw them collapse after the fetus was expelled, with a postpartum gush so torrential as to be uncontrollable.

As in ectopic, the woman may sensitize herself to a certain amount of blood loss, and if further bleeding is permanently controlled, even if she is pulseless, she will show signs of reaction. But, if in addition

to this great blood loss, any further bleeding continues, she will fail to react, for shock and hemorrhage are interdependent, and these patients are already severely shocked. Hence, I feel that surgical trauma which is attended by any further blood loss must result fatally.

What then should be the attitude in the management of these tragic cases, what will determine the plan of procedure? This will depend largely on the condition of the patient, and the condition of the cervix, for the child is a negligible factor. One is not justified in doing a cesarean section which will entail further shock and oozing to deliver



Fig. 7.—Torsion shown by position of uterine incision. Ecchymotic areas in wall.

a stillborn child, unless one is prepared first to transfuse the patient, and then prevent further blood loss by hysterectomy. Section upon this type of case has always revealed a constant pathologic picture—large areas of the uterine wall are ecchymotic (Fig. 7) and when cut through do not bleed, but ooze serum and microscopically show multiple thrombosis of the vessels of the myometrium, distorting and disintegrating the muscle fibers. (Figs. 8, 9.)

There is extreme flaccidity with little or no tendency to uterine contraction and retraction; hence, retention of the uterus necessarily

means continuation of the oozing and frequently infection, for it is exceptional that these patients have not been repeatedly examined through the vagina before admission to the hospital.

It has been my practice to prepare the patient during the observa-



Fig. 8.—Section showing hemorrhage into muscle wall and thrombosis.



Fig. 9.—Showing large thrombus in a torsioned uterus.

tion period for possible immediate operation, and secure a donor for blood transfusion by one of the direct methods, such as suggested by Unger or Miller. Experience has taught us that it is good surgical judgment to transfuse these patients before active surgery is

done upon them, or to have the transfusion coincident with such surgery. Of course, if the cervix is well dilated, the presenting-part engaged and the woman is actually in labor, a few minims of pituitary extract with a tight abdominal binder will expedite the labor; but this is not the class of case under consideration.

In the majority of these tragic cases, the unprepared cervix offers an obstacle to intrapelvic delivery; hence, it has been my plan after first transfusing the patient, to open the abdomen with a long median incision and eviscerate the uterus. Inspection will immediately show whether it requires removal or can be safely left *in situ*; for the apoplectic uterus shows numerous ecchymotic areas and fails to contract. In the presence of such a condition, the child is invariably dead, therefore, it has been my practice to clamp both broad ligaments in order to control the uterine and ovarian blood supply before incising the uterus; this permits the performance of a bloodless supracervical hysterectomy. On the other hand, if there are fetal heartsounds, and inspection of the uterus shows no intermuscular hemorrhages which are evidenced by ecchymotic areas under the perimetrium, and the uterus intermittently contracts, hysterotomy, leaving an intrauterine pack within the cavity, is a justifiable procedure.

From this study it is fair to assume:

First, that ablatio is a relatively common accident.

Second, that previous toxemia is a predisposing factor.

Third, that many of the cases have an apoplectic origin from torsion of the uterus, while very few can be attributed to trauma.

Fourth, that the symptom complex is constantly present and makes the diagnosis, which may be confirmed on vaginal examination by the escape of serum, blood or clots.

Fifth, that clinically this accident presents two general classes, the nontragic and the tragic cases.

Sixth, that in the former, intelligent expectancy in conjunction with rupture of the membranes, a tight abdominal binder, and pituitary extract will effect spontaneous delivery.

Seventh, that in the tragic cases which show progressive hemorrhage, fall in blood pressure and hemoglobin percentage, section after transfusion is the procedure of choice.

Finally, the decision between hysterotomy or hysterectomy depends on the condition of the uterine muscle.

I. FROZEN SECTIONS THROUGH UTERUS OF WOMAN DYING
DURING THIRD STAGE OF LABOR, ILLUSTRATING MECH-
ANISM OF PLACENTAL SEPARATION AND EXTRUSION.

II. FROZEN SECTIONS THROUGH UTERUS OF
WOMAN DYING FROM CENTRAL PLACENTA
PREVIA, FOLLOWING BRAXTON-
HICKS VERSION*

BY PAUL TITUS, M.D., F.A.C.S., AND VERNON L. ANDREWS, M.D.,
PITTSBURGH, PA.

(From the Department of Obstetrics and the Research Laboratories, Western
Pennsylvania Hospital, Pittsburgh.)

THESE specimens are of considerable pathologic interest, but since they have been so clearly reproduced in the accompanying illustrations by Mr. W. B. McNett of Johns Hopkins it is necessary to do little more than briefly outline the history of each case, and point out in an explanatory way certain particularly important features of each specimen.

CASE 1.—Mrs. D. W. H. (Hosp. No. 6167-1916) was a primipara, nineteen years of age. Upon admission to the hospital she was moribund with advanced edema of the lungs, dyspnea, a pulse rate inaccurately determined at about 160, and in fact, every symptom of acute cardiac decompensation. The head of a six- and a half months' fetus was showing at the vulva, and had been visible for one hour previous to admission, according to the report of Dr. J. N. Stanton who had been called to see the patient for the first time a few hours earlier.

The symptoms developed acutely at 3 A. M., this being about the time her labor began. She entered the hospital at 6:45 A. M., and without anesthesia the head was lifted out with forceps a few minutes later, the patient dying two minutes after the birth of the fetus (7:30 A. M.).

The autopsy showed edema throughout both lungs, acute exacerbation of chronic nephritis, and acute dilatation of the heart. The uterus with the placenta *in situ*, the bladder, part of the vagina and rectum were removed, frozen and longitudinal sections cut.

The sections illustrate normal placental separation and extrusion according to the mechanism of Schultze, but it is noteworthy that there is no evidence of the retroplacental hematoma which is so generally considered essential to the extrusion of the placenta by this mechanism. (Figs. 1 and 2.)

According to Williams' "Obstetrics," Baudeloeque in 1789 described the two ways in which the placenta may be extruded, saying, "In the first case the middle of the placenta being pushed forward by an

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

effusion of blood beneath it, the organ becomes inverted upon itself in such a manner that it presents by its fetal surface, et cetera." Schultze's name was attached to this mechanism in 1865, when he advanced the opinion that the placenta was usually expelled by the

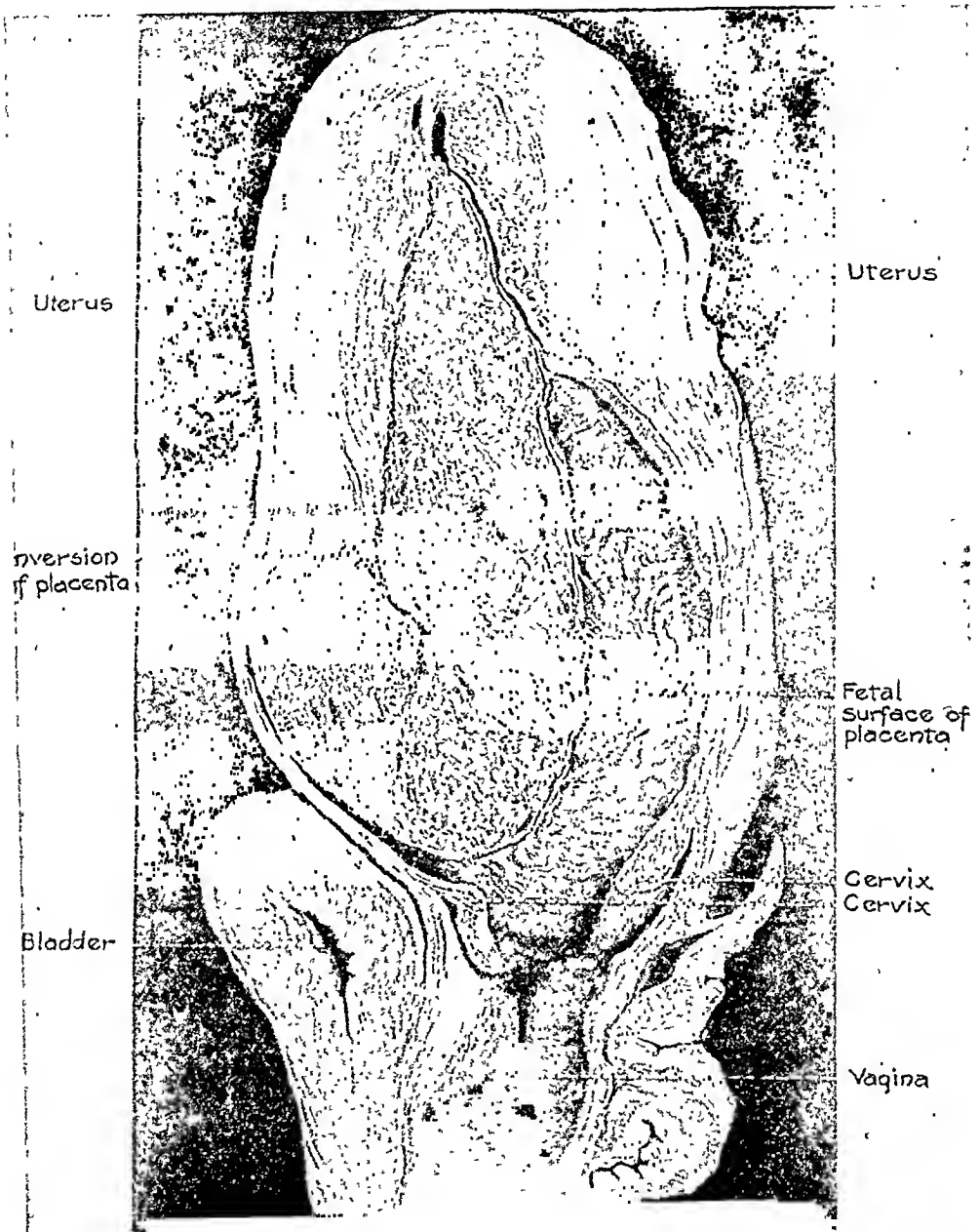


Fig. 1.—Third stage of labor. Right half of uterus. Placenta partly separated, and inverted, with fetal surface presenting at os. Unequal contraction of fundus indicates placental separation by muscular contraction with absence of the traditional retroplacental hematoma.

first method described by Baudelocque. Williams and others subscribed to these views, crediting the formation of a retroplacental hematoma of considerable size with practically all of the separation of the placenta from its site.

Fig. 1 shows the right half of the uterus with the placenta sufficiently separated and inverted that by uterine contraction alone its bulging fetal surface already presents at the external os. That this

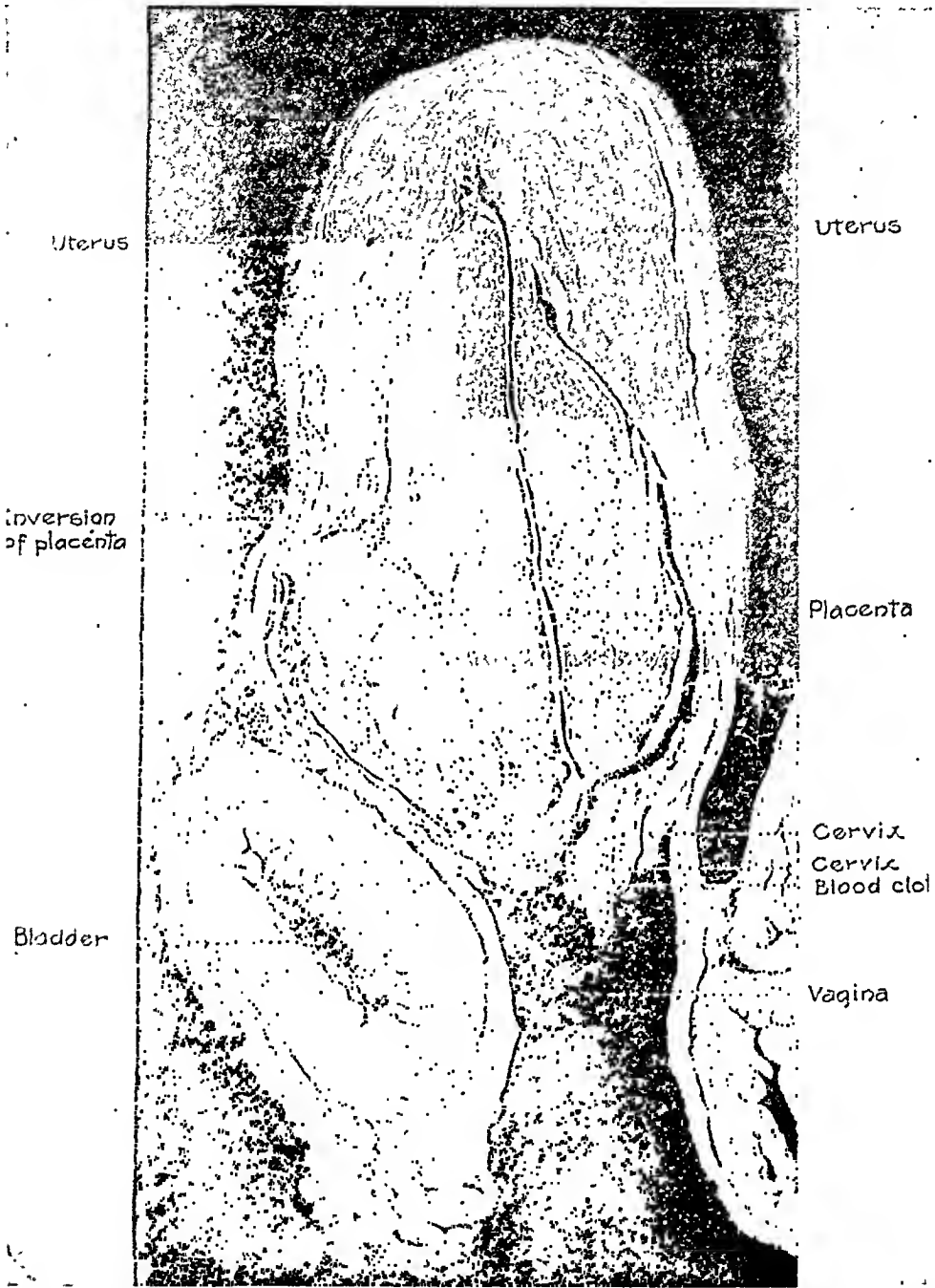


Fig. 2.—Third stage of labor. Mesial section through uterus. Placenta rolled on itself and sectioned in such a way as to show a membranous septum, with fetal surface presenting at external os. Marked muscular contraction of upper portion of uterus, lower segment still thinned out.

has been chiefly accomplished by muscular contraction is evidenced by the fact that the fundal portion of the uterus has contracted and foreshortened itself but unequally so, extending on the anterior sur-

face down to the circular vein which is generally conceded to locate the contraction ring or lower edge of the upper uterine segment.

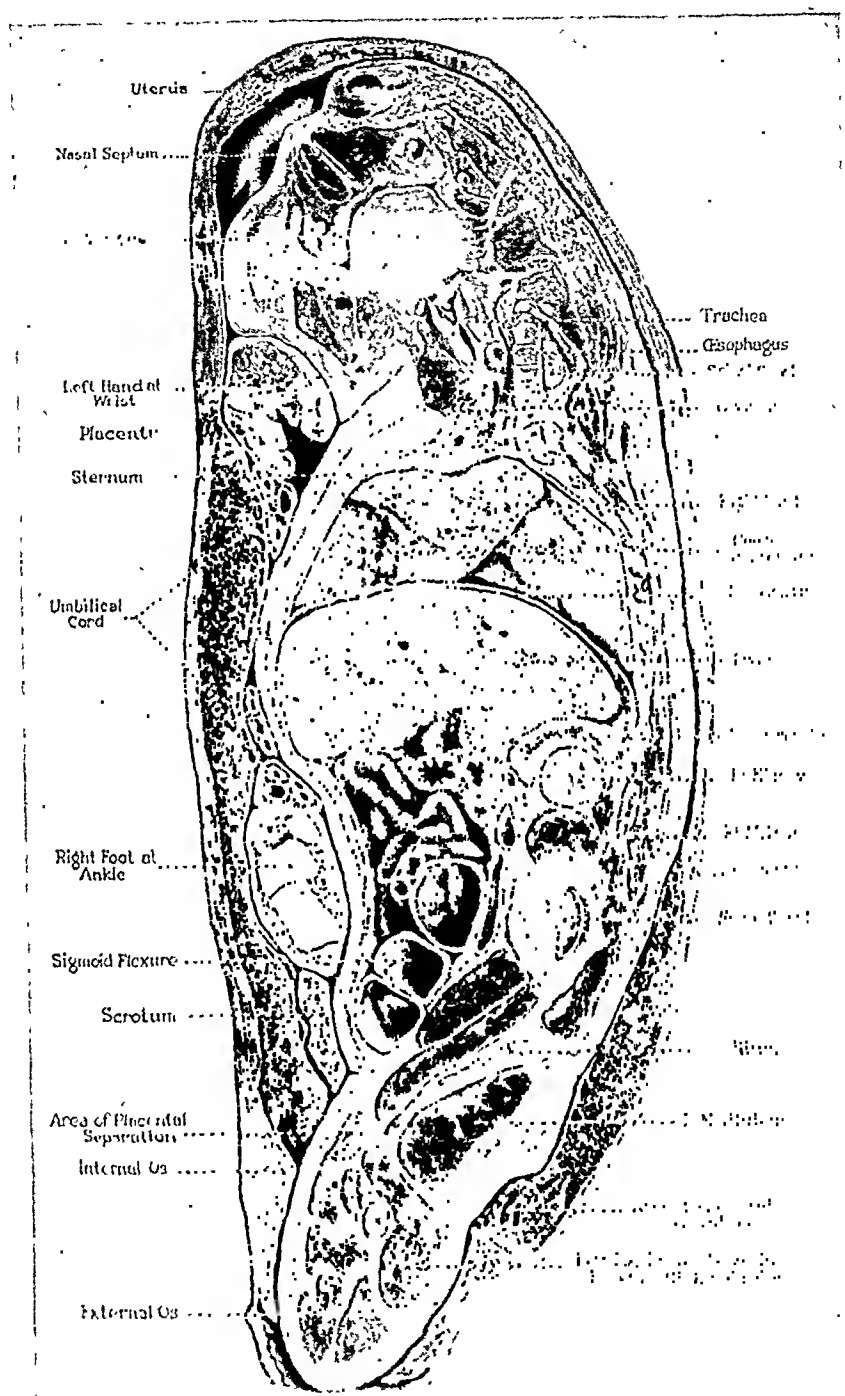


Fig. 3.—Placenta previa after version of Braxton-Hicks. Right half of uterus. Placental attachment extends high on wall of uterus, while left leg drawn down through cervix effectively tampons against further hemorrhage. Area of placental separation is comparatively slight for such profuse hemorrhage.

Posteriorly, however, the contraction and thickening of the uterine wall does not yet extend to the upper edge of the lower uterine segment, and here the separation of the placenta is still incomplete.

The inversion or infolding of the placenta with its fetal surface presenting at the external os of the cervix is clearly indicated in the drawing. The internal os cannot be identified.

Fig. 2 is a mesial section about 2.5 cm. thick. In this figure that portion of the placenta lying posteriorly, still attached at its upper end and apparently divided from the main portion by a double septum, is merely one edge of the placenta rolled round like an omelet and cut off in the sectioning. The dark mass marked below is blood clot, nor is any other intrauterine bleeding discernible in the specimen.

CONCLUSIONS

1. Placental separation, according to the so-called mechanism of Schultze in which the organ is inverted and extruded fetal surface first, is mainly accomplished by uterine contractions during third stage, comparable physiologically to those of first and second stages.

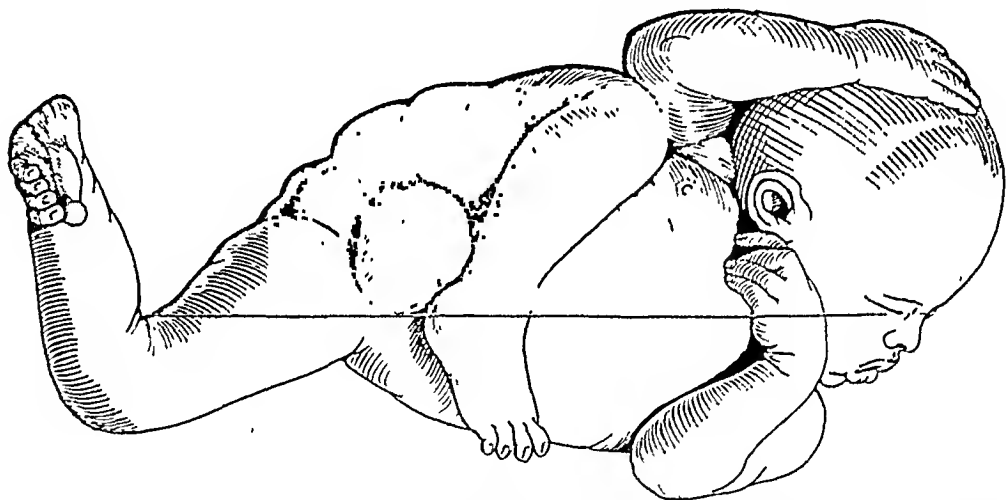


Fig. 4.—Sketch showing posture of fetus in utero after version. Line indicates direction of section through fetus, view being at right angles to that in Fig. 3.

2. In placental separation the rôle played by the supposed formation of a retroplacental hematoma has been greatly overestimated.

CASE 2.—Mrs. J. E. M. (Hosp. No. 7542-1917), a multipara aged thirty-eight, was sent to the Hospital by Dr. W. H. McCafferty of Freeport, Pa., who gave for her the following history: The patient was nearly nine months pregnant when, four days before being referred to the hospital, she had a profuse, painless hemorrhago from which she became pale and mildly shocked. During the intervening four days she bled slightly but constantly. At the time of admission she was blanched and pulseless.

The external os admitted two fingers with difficulty and the internal os was completely covered with placental tissue. This was quickly bored through and without anesthesia the combined external and internal version of Braxton-Hicks performed, the left leg being drawn down so that the knee was visible at the vulva. An intravenous injection of normal salt solution was given simultaneously but the pulse failed to return at the wrist, and three hours after admission the patient died in shock, the result of her hemorrhages.

The autopsy disclosed general anemia and pyonephritis. The pregnant uterus was removed together with part of the vagina, the specimen frozen and sectioned.

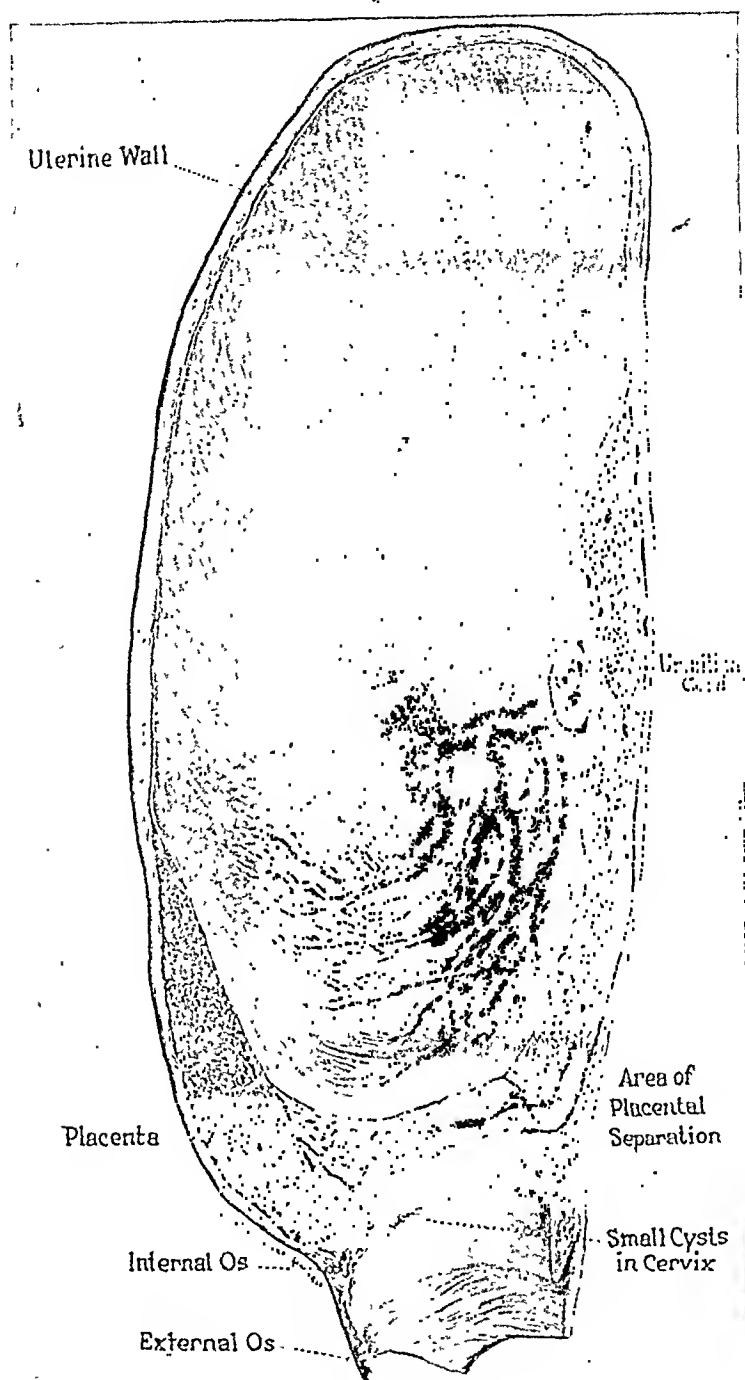


Fig. 5.—Placenta previa after version of Braxton-Hicks. Left half of uterus. Portion of sectioned fetus lifted out to show cavity of uterus with placenta attached over entire lower segment. Area of compression of placenta is seen over internal os, where thigh of fetus had been delivered to check hemorrhage from placental separation.

The illustration (Fig. 3) is self-explanatory, the outstanding features of the specimen being the size and location of the placenta, the areas

of placental separation, and the efficacy of the tamponade produced by the wedge of the thigh after version of Braxton-Hicks for placenta previa. This is the right half of the uterus.

The extraordinary height to which the edges of the central placenta previa extend up the walls of the uterus destroys the usual conception of this pathologic condition. Moreover, the apparently trifling degree of placental separation necessary for fatal hemorrhage is surprising.

The position of the fetus *in utero* after the version was such that the presenting thigh has been cut through obliquely. Fig. 4 was therefore prepared, in order that the anatomic relations noted in Fig. 3 might be clarified. This sketch shows the approximate posture assumed by the fetus after the version, the black line indicating the course of its longitudinal section, the view being at right angles to that in the preceding illustration.

Fig. 5 is a drawing of the left half of the uterus (the opposite to that shown in Fig. 3) after its portion of the fetus had been lifted out.

Here again one is surprised at the amount of uterine surface covered over by this obviously thinned out placenta. The area of placental detachment on this side is small, and the result of the pressure of dilating thigh and buttocks of the fetus on that portion of the placenta at the internal os is clearly indicated.

CONCLUSIONS

1. A central placenta previa may cover a larger portion of the uterine surface than has been generally supposed.
2. A comparatively trivial area of placental detachment may cause serious or fatal hemorrhage.
3. These sections establish the already clinically known fact that the combined external and internal version of Braxton-Hicks is an efficient method of controlling hemorrhage from placenta previa.

1015 HIGHLAND BUILDING.

TREATMENT OF PLACENTA PREVIA*

By ROSS MCPHERSON, M.D., F.A.C.S., NEW YORK CITY

(Attending Surgeon, New York Lying-In Hospital)

SO much has been written, especially in the last few years, regarding the etiology, anatomy and pathology of this condition, and so many figures have been brought to our notice, that it seems hardly worth while, in presenting this subject to an audience composed of specialists, to use up the time which is necessarily short in discussing these phases of the complication.

I wish, therefore, today to present very briefly the problem of the treatment of placenta previa by the methods commonly in vogue and to see if we cannot bring out in the discussion, the ideas of the men who are seeing these cases, and by the results of their experience put the management on a more fixed basis.

In the first place, for the purpose of studying results, it seems to me that the cases should be divided in two groups: the first, those in which there is a viable child; and the second, those in which the previa is discovered so early that the possibility of a living child is not to be considered, or only secondarily.

With this broad classification approved the methods of treatment generally in vogue may be considered. The diagnosis being established by the ordinary signs and symptoms, familiar to all, the methods presenting are:—packing the lower uterine segment, cervix and vagina with gauze, leaving it *in situ* sufficiently long to cause active labor pains and dilatation of the cervix, at the same time controlling the hemorrhage; introduction of a Voorhees bag designed to accomplish the same purpose; where sufficient dilatation already exists, rupturing the membranes, followed or not as the case may warrant, by the bringing down of the leg and allowing the labor to proceed; lastly the method of abdominal section.

All of these procedures have their advocates and undoubtedly all of them have their place, but which method is to be applied to the individual case, is the problem which demands attention. A careful survey of the published figures of various authors, shows that there is a maternal mortality of from 5 to 20 per cent, with a fetal mortality ranging from 20 to 80 per cent.

In December, 1907, I presented a series of two hundred and fifty cases from the wards of the New York Lying-In Hospital in which the maternal mortality was 18 per cent and the stillbirth mortality was 44.4

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

per cent. In the last five hundred and ninety-one cases on the same service, seventy mothers died, a mortality of 12.1 per cent, with a still-birth mortality of about 42 per cent. A considerable improvement in the maternal mortality, but only a very slight one in that of children. Again many of the children died within the first few days, due to prematurity, for in the five hundred and ninety-one cases three hundred and seven or more than half the total, were premature.

Armin Wachter¹ quotes a maternal mortality ranging from 7.6 per cent in 1888-1907 down to 3 per cent from 1914-1918, but gives a fetal mortality of 74.8 per cent and is inclined to favor packing followed by version.

Hannal² favors rupturing membranes early and either allowing the head to control the hemorrhage, or doing bipolar version. He also favors cesarean section in the latter months of pregnancy.

Brodhead³ believes that cesarean section should be done in all patients having a central previa near term where the child is viable, or in the same case even with a partial previa if no dilatation be present, quoting a maternal mortality of 15 per cent.

Boyd,⁴ on the other hand, reports a series of fifty-nine cases with a mortality ranging from 7 per cent to 11.8 per cent, a fetal mortality of 79 per cent in which cesarean section was done, and therefore concludes that cesarean section should not be performed.

Hirst⁵ goes into the treatment in great detail, and favors the bag and internal podalic version. He quotes a maternal mortality of 7 per cent with a fetal mortality of 60 per cent. He favors cesarean section done in the interest of the mother.

In my recent series already mentioned, the preference in treatment was given to gauze packing, followed in most instances by an internal podalic version, this being done in 354 out of 591 cases. There were 34 abdominal cesarean sections, two extraperitoneal cesarean sections, three vaginal hysterotomies, 20 Braxton-Hicks operations, 43 breech extractions and 22 craniotomies on dead children, the rest being made up of forceps and normal deliveries. The resultant mortality to the mother, as already stated, was 12.1 per cent with a stillbirth mortality of 42 per cent. One hundred and seven children, born alive, died before leaving the hospital, or about 18 per cent, a total fetal mortality of slightly over 60 per cent.

Granting that in many instances, perhaps in the greater proportion, the mothers were greatly exsanguinated on entrance to the hospital, that the children were premature or not alive when first seen, all of which conditions must necessarily prevail in a service as acute as ours, it will be well to observe from experience what seems to be the most satisfactory way of handling these cases.

No one thing has contributed more to the successful issue in placenta previa, as far as the mother is concerned, than the practice of blood transfusion, so that in all cases as soon as the diagnosis is established, the mother should be grouped as to her blood and a satisfactory donor obtained whose presence should be maintained within easy reaching dis-

tance until the necessity for his or her services is no longer needed for the patient. The factor of time in giving a transfusion is of the utmost importance, as well as that of proper technic, and it follows then, as a matter of course, that the patient should be in a well equipped hospital which in these days is practically always available.

Having made the diagnosis, *immediate treatment* should be instituted without procrastination, and one of the recognized methods of operation employed. From my experience and the reports of others, it would seem that if the patient has an undilated or slightly dilated cervix, is at term or nearly so and has a living child, that an abdominal cesarean section rapidly performed by a competent operator offers the best solution for mother and child, this applying to primipara and multipara alike. If the patient is in fair condition when first seen, and has not been infected by injudicious manipulation, the ensuing result should vary little from that of similar operation done for some other indication. If, on the other hand, the child be dead or nonviable, one of the other less drastic means of delivery may be employed, and of these in general I am inclined to favor tamponade with iodoform gauze strips. This will, in practically all instances, control the hemorrhage, especially if the membranes are first ruptured; it stimulates labor pains, causing dilatation of the cervix, stays where it is put until removed by the operator, which is not always the case with hydrostatic bags, and if applied under aseptic conditions, is, in my opinion, not as potent a source of infection as commonly believed. Iodoform is used in preference to plain gauze because it resists putrefaction longer than plain gauze, and if packed tightly rarely gives rise to iodine poisoning. The gauze should be firmly packed as far up as it will go into the uterine cavity, the cervix filled, as well as the vaginal fornices, and the vagina. Such a pack in nearly every instance thoroughly controls hemorrhage and may be left *in situ* for a considerable time without cause for worry.

When the patient has had hard contractions for some time and it is judged that the cervix is sufficiently dilated to allow the extraction of the child, she may be placed on the operating table, an anesthetic administered, under the best aseptic precautions, the packing removed and the extraction proceeded with in the manner chosen by the operator. I usually remove the placenta manually and repack the uterus. Care should be taken not to handle the cervix more roughly than necessary, as in these cases it is very friable and more apt to tear, thus promoting hemorrhage and subsequent infection. A transfusion should be ready at the time of delivery and if there is any doubt at all of its necessity, it should be given without delay. Pituitrin and ergot may be used after delivery and uterine packing to aid in contracting the uterus.

I believe that most of the maternal mortality in placenta previa is

due to delay in diagnosis of the condition, accompanied by tardiness in treatment, combined with careless manipulation and resultant infection, all of which are preventable and inexcusable. If these factors are eliminated, as they can be, the results for the mother should be much improved and a patient will rarely be lost. Regarding the fetal mortality, so much cannot be said, as the greater majority of the children are so premature that little can be done to save them even if born alive. Cesarean section on the viable fetus, does offer a means of lowering this mortality to an appreciable degree and should be employed in this class of cases more frequently.

REFERENCES

- (1) *Wachter, Armin*: Schweiz. med. Wehnschr., 1920, 1, 618. (2) *Hannal, Calvin R.*: Texas State Jour. Med., 1921, xxvi, 439. (3) *Brodhead, George L.*: New York State Jour. Med., 1918, xviii, 389. (4) *Boyd*: Am. Jour. Obst., 1917, No. 1, 76. (5) *Hirst, B. C.*: Internat. Clin., 1917, ii, 79.

125 EAST THIRTY-NINTH STREET.

(For discussion see p. 477.)

THE URIC ACID CONTENT OF HUMAN AMNIOTIC FLUID

BY J. LISLE WILLIAMS, M.D., AND J. A. BARGEN, M.D., EVANSTON, ILL.

(From the Pathological Laboratory of St. Luke's Hospital, Chicago, Ill.)

IN his comprehensive studies of the physical and chemical properties of human amniotic fluid Uyeno¹ demonstrated the presence of uric acid, but was unable to estimate the amount. Apparently this is the only instance mentioned in the literature regarding either the presence or amount of uric acid in human amniotic fluid. Previously Amberg and Rowntree² had discovered that creatinine is a normal constituent.

The improvement in methods for the quantitative estimation of the nonprotein nitrogen constituents of body fluids has made possible their accurate determination in the amniotic fluid. These substances as well as the amount of the sugar and chlorides and the carbon dioxide combining power were determined quantitatively. The amniotic fluids of twenty women were examined, eleven of whom were normal and nine were from patients abnormal in some way. The fluid was obtained by aseptic puncture of the fetal membranes during labor or in two instances from the uterine cavity after hysterectomy. Chemical analysis was started immediately or after a few hours' refrigeration. Owing to the obvious impossibility of obtaining all the fluid during labor no attempt was made to measure all the fluid present. The amount of fluid actually obtained varied from 19 to 590 c.c. Except

in one patient with hydramnios the amount did not appear to exceed the normal.

The methods of Folin and Wu³ were used for the determination of the sugar and nonprotein nitrogen substances, that of Austin and Van Slyke⁴ for chlorides and that of Van Slyke and Cullen⁵ for the carbon dioxide combining power. A check on the method for sugar in the amniotic fluid was made by using the method of Benedict and Osterberg⁶ for sugar in normal urine and the comparative results were satisfactory.

The results of these studies are collected in the following tables. In Table I are the figures from the amniotic fluids of eleven normal women; in Table II the results from nine abnormal women.

TABLE I

NO.	SUGAR %*	UREA N*	TOTAL N-P-N*	URIC ACID*	CREATININE†	CHLORIDE*	CO ₂ ‡
1	.017	17.00	23.70	6.71	1.96	5.93	37.63
2	.014	16.77	27.17	4.49	1.89	5.20	26.92
3	.022	10.51	21.27	1.99	1.64	6.66	
4	.035	18.04	22.67	1.93	1.70	6.02	
5	.021	21.29	33.56	4.75	1.92	5.52	
6	.000	20.55	31.26	4.61	2.28	6.51	39.01
7	.021	18.87	26.60	4.05	3.95	6.05	30.39
8	.014	26.95	33.71	6.46	2.49	5.70	36.35
9	.011	17.18	25.74	2.52	2.03		
10	.020	11.34	16.22	4.33	2.15	6.33	39.30
11	.021	22.31	35.45	7.73	3.61	5.39	33.83
Av.	.0196	18.25	27.05	4.51	2.33	5.93	34.77

TABLE II

NO.	SUGAR %*	UREA N*	TOTAL N-P-N*	URIC ACID*	CREATININE†	CHLORIDE*	CO ₂ ‡
1	.0205	27.00	36.82	5.51	2.40	5.82	27.64
2	.017	11.98	20.98	2.93	2.01	6.25	37.36
3	.013	12.17	16.26	3.54	1.96	6.09	34.88
4	.000	49.74	75.96	8.51	2.73		
5	.025	15.04	19.47	1.94	1.25	6.33	29.27
6	.000	13.44	23.71	5.20	2.19	6.37	37.90
7	.019	18.93	26.13	2.19	2.14	5.99	31.00
8	.033	40.58	55.23	2.46	6.66	6.99	32.35
9	.025	11.91	17.90	1.98	1.35	6.48	28.77
Av.	.017	22.53	32.49	3.81	2.52	6.28	32.39

*mg. per 100 c.c. of fluid.

†gm. per liter of fluid.

‡gas in volumes per cent.

• DISCUSSION

The results listed in the tables demonstrate that both uric acid and creatinine are present in the amniotic fluid of pregnant women in measurable amounts. The concentration appears not to vary in relation to any particular pathologic condition although the highest value, 8.51 mg. per 100 c.c., was present in the fluid of a patient with the toxic vomiting of pregnancy. However, as the normal women ap-

proached the termination of their pregnancy, the concentration of uric acid appears to increase and the highest value, 7.73 mg., was obtained from a patient three weeks overdue.

Included in Table I are the results obtained from the fluids of five women whose pregnancy terminated from three days to three weeks before term, and six in whom labor was delayed for three days to one month after the expected time. In the latter group the averages for urea, total nonprotein nitrogen and uric acid are about 40 per cent higher than in the former. The averages for creatinine, chlorides and the CO_2 combining power are approximately the same. The values obtained for urea, nonprotein nitrogen and chlorides agree fairly well with those published by Clogne and Reglade⁷ and Labat and Favreau.⁸ This fact supports the theory that the amniotic liquid at term may consist partially of fetal urine. The observations of Labruhe⁹ are in accord with this view.

In the amniotic fluid of three patients with hypertension or pre-eclamptic toxemia the average amount of uric acid is 3.99 mg. per 100 c.c. as compared with 4.51 mg. for that of the normal patients. Age, race and the number of pregnancies have no appreciable effect upon the concentration of any of the organic or inorganic constituents studied.

Uyeno¹⁰ found no sugar but demonstrated d-lactic acid as a constant component. Labat and Favreau¹¹ examined six fluids and demonstrated 0.1 per cent dextrose in one. With the method here employed all but three fluids contained sugar in measurable quantities.

In hydramnios Prochowniek and Harnaek¹² found the amount of urea and creatinine increased. The values reported here for one patient with hydramnios are essentially the same as the average for normal women.

Observations on both blood and amniotic fluid were made simultaneously on five women and in every patient the concentration of uric acid in the amniotic fluid was higher than in the blood; the average amount in the amniotic fluid was 5.29 mg., in the blood 3.60 mg. per 100 c.c.

CONCLUSIONS

1. Uric acid and creatinine are demonstrable in human amniotic fluid by Folin's methods and exist in a concentration greater than in the blood.

2. The reducing sugars in the amniotic fluid can be estimated by the method of Folin and Wu, the concentration normally averaging about 0.02 per cent.

3. The amount of urea, nonprotein nitrogen and uric acid in human amniotic fluid increases as the term of pregnancy is prolonged.

4. The capacity of the amniotic liquid to combine with CO_2 is considerably less than that of normal blood.

5. The increase of the nonprotein nitrogen in the amniotic fluid in advanced pregnancy suggests that the fetal urine may be a partial source of the liquid.

6. The greater concentration of uric acid in the amniotic fluid over that in the blood suggests that in the toxemias of pregnancy the increased uric acid of the blood may arise in part from a more highly saturated amniotic fluid.

REFERENCES

- (1) *Uyeno, D.*: Jour. Biol. Chem., 1919, xxxvii, 77-103. (2) *Amberg, S. and Rowntree, L. G.*: Bioch. Centralbl., 1905, x, 237. (3) *Folin, O. and Wu, H.*: Jour. Biol. Chem., 1919, xxxviii, 81-110; *ibid.* Supplement I, 1920, xli, 367. (4) *Austin, J. H. and Van Slyke, D. D.*: Jour. Biol. Chem., 1920-1921, 461-463. (5) *Van Slyke, D. D. and Cullen, G. E.*: Jour. Biol. Chem., 1917, xxx, 347-368. (6) *Benedict, Stanley R. and Osterberg, E.*: Jour. Biol. Chem., 1921, xlviii, 51-57. (7) *Clogne, R. and Reglade, J.*: Compt. rend. Soc. de Biol., 1921, lxxxiv, 491-493. (8) *Labat, A. and Favreau, M.*: Jour. de med. de Bordeaux, 1921, li, 341-342. (9) *Labruhe*: Quoted by Labat and Favreau, *Loc. cit.* (10) *Uyeno, D.*: *Loc. cit.* (11) *Labat and Favreau*: *Loc. cit.* (12) *Prochownick and Harnack*: Quoted by Hammarsten and Hedin, 1914, 642.

2650 RIDGE AVENUE.

URIC ACID IN THE BLOOD IN THE TOXEMIAS OF PREGNANCY

By E. L. KING, M.D., AND W. DENIS, PH.D., NEW ORLEANS, LA.

(From the Department of Obstetrics and the Laboratory of Physiological Chemistry of the School of Medicine, Tulane University.)

ABOUT two years ago Williams¹ published the results of a series of observations on the blood of pregnant women suffering from various types of toxemias, as a result of which he was led to the conclusion that in the blood of patients with eclampsia, hyperemesis gravidarum, and with the symptoms of preeclamptic toxemia together with arterial hypertension, the uric acid is markedly increased, that on delivery and recovery this constituent of the blood of such patients declines to a normal figure, and finally that the toxic vomiting of pregnancy is associated with an increase in the uric acid in the blood, whereas the nervous or physiologic vomiting is not. Shortly after the appearance of Williams' paper, Caldwell and Lyle² and Killian and Sherwin³ published the results of extensive series of observations on the nonprotein constituents of the blood of normal pregnant women and of patients suffering from toxemias of various types, and reported that in many of these latter cases notable increases in blood uric acid were found.

TABLE I

URIC ACID IN THE BLOOD OF NORMAL PREGNANT WOMEN

CASE NO.	AGE	GRAVIDA	GESTATION MONTH	MG. PER 100 C.C.	
				NONPROTEIN NITROGEN	URIC ACID
36	20	II	2.0	27.6	2.0
49	18	I	2.0	29.2	3.2
62	18	I	2.0	21.7	2.4
42	22	II	3.0	22.6	2.1
40	31	IV	4.0	24.5	2.7
63			4.0		
1	25	I	4.0	25.5	2.9
3	21	I	4.0	25.0	2.8
5	17	I	4.0	25.4	2.9
23	30	III	5.0	22.6	1.9
26	18	I	5.0	20.8	2.1
2	27	III	6.0	24.0	2.8
4	24	II	6.0	29.8	2.7
7	25	VI	6.0	31.2	2.6
9	22	III	6.0	29.4	2.8
51	19	II	6.0	22.2	2.9
60	18	II	6.0	22.2	2.1
29	22	I	6.0	24.0	2.1
6	18	I	7.0	24.1	2.8
16	19	I	7.0	30.6	3.0
17	22	I	7.0	28.1	2.9
19	17	I	7.0	24.5	2.8
20	37	IX	7.0	25.7	2.6
24	23	I	7.0	25.5	2.8
31	38	II	7.0	25.5	2.4
35	18	I	7.0	26.0	2.5
41	17	I	7.0	27.2	2.5
44	23	IV	7.0	29.9	3.0
48	20	II	7.0	24.9	2.5
53	35	VIII	7.0	23.5	2.3
56	19	I	7.0	24.9	2.16
55	22	I	7.5	23.5	3.3
46	16	I	7.5	24.6	2.2
33	17	I	7.5	23.1	2.3
11	19	I	8.0	23.0	2.5
12	37	VIII	8.0	21.8	2.2
13	17	I	8.0	28.5	2.7
16	24	I	8.0	24.0	2.6
22	30	VI	8.0	25.7	2.2
25	20	I	8.0	22.21	2.4
27	21	IV	8.0	27.2	2.7
28	18	I	8.0	22.9	2.1
32	25	V	8.0	23.0	1.9
38	21	I	8.0	24.4	2.1
39	18	I	8.0	24.9	2.7
43	15	I	8.0	21.4	2.5
45	24	III	8.0	23.5	3.0
52	21	II	8.0	20.3	2.1
54	21	II	8.0	24.9	2.5
58	22	II	8.0	20.3	2.1
59	20	I	8.0	25.5	3.3
47	18	I	8.5	24.9	3.2
8	37	VI	9.0	30.	3.2
14	21	I	9.0	21.4	2.5
15	22	II	9.0	29.2	3.1
18	23	IV	9.0	25.7	2.9
21	18	II	9.0	21.8	2.0
30	23	III	9.0	29.6	2.6
34	25	II	9.0	26.6	3.2
37	21	I	9.0	23.5	2.5
50	27	III	9.0	30.7	3.2
57	17	I	9.0	22.6	3.2

TABLE II

URIC ACID IN THE BLOOD OF PATIENTS SUFFERING FROM VARIOUS TYPES OF TOXEMIAS OF PREGNANCY

CASE NO.	DATE	MG. PER 100 C.G.		HISTORY
		NON-PROTEIN NITROGEN	URIC ACID	
5	7/ 9/21	25	8.1	A multipara, age 40 years, had 2 convulsions and died 12 hours after admission. Had been under treatment for albuminuria and hypertension. Blood sample taken shortly before delivery.
24	8/18/21	33	6.5	a) A primipara, 19 years old, colored, admitted in labor, 3 convulsions after admission, delivered in 75 minutes, had been edematous for 4 to 5 weeks, but without toxic symptoms. Blood taken on day of delivery.
24	8/26/21	28	5.1	b) Convalescent, urine still shows albumin.
24	8/30/21	25	5.0	c) This sample taken just before patient was discharged from the hospital. Urine still shows albumin.
30	8/26/21	32	4.6	A multipara, age 22 years, slight edema for 4 months, normal delivery 23¼ hours after admission. B.P. systolic, 220. Urine showed a large trace of albumin and many casts. Recovery, but with persistent hypertension. Blood sample taken the day after delivery.
39	10/23/21	24	7.6	A primipara, age 21 years, edema for one week with some toxic symptoms with 1 convulsion 16 hours before labor was induced. Blood sample taken shortly before labor.
39	11/ 3/21	39	5.6	The second sample was taken shortly before discharge, at which time the patient still showed hypertension and albuminuria.
42	11/ 9/21	33	5.0	A multipara with a history of 2 normal pregnancies. Marked albuminuria and hypertension. Labor induced 11/14/21.
42	11/29/21	35	3.9	At this time, although the patient's condition was good, albuminuria still persisted.
43	11/29/21	130	10.2	A multipara, with a history of previous normal pregnancies admitted in coma, 4 convulsions in 8 hours, 1 convulsion 1 hour after cesarean section. Blood taken before delivery.
43	12/16/21	100	10.1	Convalescent. Urine still contains a large trace of albumin. B.P. Systolic, 190.
45	11/29/21	30	3.0	A multipara, hypertension and albuminuria, normal delivery 12/10/21, recovery.
46	11/29/21	60	10.2	A multipara, age 44. Urine shows much albumin and many casts. Delivered of a stillborn child (macerated) 3 days after the sample of blood was taken. Recovery.
56	2/ 9/22	62	4.4	Primipara, age 18 years, urine showed albumin and casts, labor induced. Died.
49	12/10/21	75	6.6	A multipara, age 26 years, admitted in coma, several convulsions in 10 hours, delivered a few hours after the sample of blood was taken. Died.
53	2/ 2/22	32	5.0	A primipara, 18 years old, general edema, urine shows a large trace of albumin and a few casts. Delivered 2/29/22. Recovered.
54	2/ 2/22	28	2.5	A primipara, albuminuria, and slight toxic symptoms on admission. Delivered 2/26/22. Recovery.

About two years ago, we were led by the observations contained in Williams' paper to make a collection of results of uric determinations in the blood of normal pregnant women and of patients with various toxemic conditions, with a view to testing out the diagnostic and prognostic value of uric acid determination in the blood in such conditions. The earlier determinations of uric acid, and all of the non-protein nitrogen figures were obtained by the methods of Folin and Wu;⁴ the revised uric acid method of Folin⁵ was employed in all the later analyses. Our blood samples were obtained from the out-patient clinic and the obstetric wards of the New Orleans Charity Hospital. In Table I are presented the results obtained on the blood of 62 normal pregnant women, in which collection examples of early, late and middle pregnancies are represented.

In these cases the lowest uric acid value obtained was 1.9 and the highest 3.2, while the great majority were between 2.2 and 2.5 milligrams per 100 c.e.,—values which are well within normal limits. As far as could be determined parity, age and the stage of gestation were without demonstrable effect on the concentration of the blood constituent.

In Table II are collected the results obtained on eleven cases of eclamptic and preeclamptic toxemia. In these cases an attempt was made to obtain a sample of blood before delivery, and one or more samples after delivery and during convalescence; but in many of the patients this was not possible, so that in a number of cases our observations are limited to a single analysis.

Our results may be considered as a confirmation of the observations of Williams, of Caldwell and Lyle, and of Killian and Sherwin regarding the accumulation of uric acid in eclamptic and preeclamptic toxemias, although we feel unable, either from a study of the clinical manifestations, or from an analysis of the blood to make (without the assistance of an autopsy) a differential diagnosis between hepatic and renal toxemias as have the latter investigators.

We believe that the determination of blood uric acid promises to be of considerable value in diagnosis and prognosis in eclamptic and preeclamptic conditions. Our experience has been that in preeclamptic toxemias the increased blood uric acid may serve as a useful test in doubtful cases. In our rather short series of cases we have invariably found that the more severely toxic patient showed extremely high uric acid values, a condition which was associated with little or in most cases a relatively small rise in the nonprotein nitrogen, and in cases of recovery with a relatively slow decline towards normal values. We therefore believe we are justified in making the statement that after a sufficient time has elapsed to allow for the collection of

adequate data it may be found that this determination may prove of at least equal value with the clinical tests now in use.

REFERENCES

- (1) *Williams, J. L.*: Jour. Am. Med. Assn., 1921, lxxvi, 1297. (2) *Caldwell, W. F. and Lyle, W. G.*: AM. JOUR. OBST. AND GYNEC., 1921, ii, 3. (3) *Killian, J. A. and Sherwin, C. P.*: AM. JOUR. OBST. AND GYNEC., 1921, ii, 2. (4) *Folin, O. and Wu, H.*: Jour. Biol. Chem., 1919, xxxviii, 81. (5) *Folin, O.*: Jour. Biol. Chem., 1922, liv, 153.

512 HIBERNIA BUILDING.

HEPATITIS IN ITS RELATION TO INFLAMMATORY DISEASE OF THE ABDOMEN: A CLINICAL AND LABORATORY STUDY*

BY CHARLES GORDON HEYD, A.B., M.D.; WARD J. MACNEAL, PH.D.,
M.D.; JOHN A. KILLIAN, M.A., PH.D., NEW YORK, N. Y.

CLINICAL DISCUSSION (DR. HEYD)

IN considering hepatitis¹ we shall define that form of hepatitis that is associated with, or sequential to, the more chronic inflammatory diseases of the abdomen, particularly those affections involving the right upper quadrant and the appendix. Abscess, infarct, and embolism of the liver as complications of suppurative conditions, either in the abdomen or elsewhere, are not included. We refer specifically to the low grade inflammatory changes in or about the small bile radicals, the interlobular septa, the periportal veins and intrinsic degeneration of the hepatic cells.

We have recognized for a number of years a cholecystic toxemia² which manifests itself by changes in organs quite remote from the liver. During this period of time we have also been impressed with the macroscopic picture of the liver in patients operated upon for chronic disease of the biliary tract. There was a well founded idea that many of these cases show definite liver changes, either subsequent to infection of the gall-bladder or coincident with gall-bladder infection. From time to time in checking up our after-results we have been impressed with the clinical fact that those patients who showed gross demonstrable changes in the liver at laparotomy were those least benefited by surgery. We are convinced that there are certain types of liver change that are associated with chronic abdominal infection, and which render the patient somewhat of an invalid even after successful surgical intervention.

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

Peterman³ reported that in 130 unselected cases of gall-bladder disease admitted to the surgical service of Barnes Hospital, St. Louis, Mo., there were 82 cases of undoubted liver involvement. Of these 69 were "enlarged" or "edematous," five showed adhesions alone and eight were "atrophic" or scarred. We⁴ have drawn attention to the fact that at autopsies made on patients suffering from simple gastroduodenal ulcer there were always present more or less advanced hepatic lesions. MacCarty and Arnold Jackson⁵ stated that in a series of 58 cases studied in relation to hepatitis 81 per cent showed chronic inflammation. The livers were studied independently of any knowledge of the condition of the gall-bladder. Peterman, Priest and Graham⁶ regularly produced experimental cholecystitis by injection of organisms into the lumen of the gall-bladder after ligation of the cystic duct and vessels. An associated hepatitis was invariably found associated with the cholecystitis.⁶ Fuetterer⁷ was able to recover bacteria injected into the portal vein two minutes later in the bile. Charcot (quoted by Ehret and Stolz⁸) produced biliary tract inflammation and later cirrhosis of the liver with marked hepatic changes by ligation of the common bile duct in rabbits and guinea pigs. Adami has demonstrated that under normal conditions colon bacilli may be present in the blood stream and eliminated from the liver in apparently normal bile. It is doubtful, however, if bacteria can pass through a normal liver on account of the high bactericidal power possessed by the liver tissue. It would appear more probable that there must be some inflammatory changes in the liver itself to allow bacteria to traverse the liver substance. An injection of microorganisms in the appendiceal vein is followed by hepatitis and cholangitis while surgical infection of the liver by way of the portal system has its clinical pathology well demonstrated in the septic pyelophlebitis following gangrenous appendicitis.⁹ This is essentially an acute septic process and a mechanism of liver injury with which we are not concerned at this time.

Werelius¹⁰ in discussing high intestinal obstruction has brought forward experimental evidence that in all drained duodenal loops bile secretion stops before death. It is possible that with the cessation of biliary secretion the other hepatic functions are simultaneously terminated and death is the result of liver insufficiency. As a corollary, the liver insufficiency is directly due to liver exhaustion following the absorption of the toxic substances which accumulate within the lumen of the obstructed gut.

The question naturally suggested is, what is the route by which the liver is injured in these cases. There is no anatomic connection be-

⁹Nine out of the nineteen experimental dogs died of a general peritonitis. The hepatitis might possibly be due to the peritonitis rather than the cholecystitis.

tween the arterial blood of the gall-bladder and liver, the only canalicular system common to both organs in the lymphatic system. There is also no anatomic route from the appendix to the gall-bladder except through the intermediate agency of the portal system and the liver. The liver may be infected presumably in five ways: (1) hematogenous infection; (2) by means of the portal system; (3) through the lymphatics and (4) from contact with contiguous pathologic organs; (5) ascending infection by way of the bile ducts.

We have extended our study to the microscopic examination of specimens of liver removed during the course of operations for acute and chronic appendicitis, ulcer, and carcinoma of the stomach. In a few traumatic cases we have studied the liver for purposes of obtaining a normal control. The observations were made preponderantly in cases of gall-bladder disease. It has been our custom, however, to remove the appendix through a high right rectus incision and advantage has been taken to study the liver in the course of operations for acute and chronic appendicitis, as well as all pathologic conditions affecting the gastroduodenal segment. The study, so far as the liver itself was concerned, embraced a careful inspection of the liver in regard to: (1) size, shape, deformities, disproportion in lobes, changes in color as well as differences in the color, contour and texture between the right and left side of the liver; (2) the character of the anterior border with estimation of friability; (3) the presence of crenation, retraction and dimpling of liver tissue; (4) changes in the surface of the exposed portion of Glisson's capsule, the presence of subscapular infiltration, fibrous tissue replacement, adhesions, stellate cicatrices, wrinkling of liver surface, opacity of Glisson's capsule with infiltration or thickening of falciform or round ligament and fibrosis at umbilical notch,—in short, partial or complete Glissonitis; (5) the presence of adhesions about the gall-bladder and central fissure, an increase in fibrous elements about the gall-bladder notch, widening of area of opacity on either side of gall-bladder by fibrous tissue replacement, etc.

It has been our custom to remove two to three pieces of liver tissue in each case. The first section removed was usually from the neighborhood of, or adjacent to, the gall-bladder, the second piece from the superior surface of the right lobe and about 5 cm. distant from the gall-bladder, and less frequently from the superior surface or anterior border of the left lobe, depending upon the accessibility of this portion of the liver. It may be stated that when we found macroscopic liver changes present these pathologic changes were uniformly distributed throughout the right lobe of the liver, and at the same time there was always evidence of the same pathologic process in the left lobe but ordinarily of less intensity than in the right lobe. It occa-

sionally happened that the liver changes were much more marked than the associated pathology in the gall-bladder, appendix or stomach. In other words, the changes in the abdominal viscera were quite minimal as compared to those encountered in the liver. Insofar as the gall-bladder was concerned as an etiologic factor in hepatic change it did not seem to make much difference whether stones were present or absent. The essential elements were apparently: (1) chronicity of the infective processes; (2) the persistence of a certain degree of intensity of the offending agent—chemical or biochemical. In catarrhal types of appendicitis and cholecystitis the evidence obtained from inspection of the liver consisted in a thickening of the capsule, with occasional adhesions, with thickening of the anterior border, with erosion, swelling and surface dimpling. In localized gall-bladder disease the changes in the area of the gall-bladder region were more intense than elsewhere, and the quality of the change varied inversely with the distance from the gall-bladder. In these cases the microscopic examination of the liver section would show subcapsular lymphocytic infiltration and intercellular lymphatic infiltration. If there were an acute inflammation in the appendix or gall-bladder disease, leucocytic infiltration would be merged with lymphocytic infiltration. When the abdominal condition was essentially chronic the surface changes on the liver would become more marked and more diffuse, together with an increase in the size of the liver. The liver was grossly enlarged in about 50 per cent of the cases and the enlargement when present was confined in about 90 per cent of the cases to the right lobe and particularly the outer and posterior half of the right lobe—the quadrate and caudate lobes not participating in gross enlargement. Microscopically the liver changes in the more chronic cases represented an advance in pathologic intensity with the chronicity of the abdominal condition. Uniform fibrosis was more marked, loose connective tissue would be found in abundance about the bile ducts and portal veins, bile stasis would be more apparent with hyperplasia and budding of immature bile ducts. Leucocytic and lymphocytic infiltration would extend between flattened and distorted liver cells. Many of the latter would show vacuoles and disintegration, occasionally intra- and intercellular pigment, with some fatty degeneration and hepatic cell destruction, rarely hyperplasia of blood capillaries and an increase in syncytial cells of Kupffer. Apparently, so far as we could observe, there was no definite parallelism between the gross and qualitative liver changes and the pathologic condition of the associated abdominal condition. In some cases it was apparent that the force of the affection was spent on the originally infected viscus remote from the liver; in other cases the force of the offending agent apparently exerted its greatest injury on the liver with

minimal changes in the extrahepatic viscera which many times was showing a well established repair.

The liver ^{11, 12} is a complete biochemie laboratory which, interposed between the portal and systemic circulation, transmutes the food into energy value. It is the chief of the metabolic work shops and regulates body metabolism by enzyme action. Some of the enzymes are intrinsic and elaborated by the liver itself and others are extrinsic and brought to it from different viscera by the circulation. Hess and Serege¹³ ascribed various functions to different portions of the liver. It is interesting to recall that Silvestri¹⁴ and others attempted to specialize liver function in regard to the right and left lobes of the liver. It has been a frequent observation that when the liver is enlarged in diabetes the right lobe is more uniformly affected, while in Banti's disease and other splenomegalias it has been observed that the left lobe participates more particularly, while tropical liver abscess is almost exclusively on the right side. The work of Glenard and Serege lends emphasis to this contention for in their experiments the left lobe of the liver is intimately connected with the stomach and spleen, while the right exhibited more definite relationships with the pancreas and small intestine, and the ordinary form of interstitial cirrhosis manifests itself most markedly on the left side. The injection of staining fluids into the spleen invariably produced discoloration of the liver limited to the left lobe while injections into the superior mesenteric veins, as a rule, stained the right lobe of the liver more than the left.¹⁵

The liver has an unusual vascular supply, an arrangement of afferent and efferent blood that is found in no other organ in the body.¹⁶ The spleen and kidney perform their specific functions in the presence of a large supply of oxygenated blood. The liver, to the contrary, performs its functions with a blood that, except for a relatively very small amount of arterial blood supplied by a minor portion of the hepatic artery, is entirely of a venous type. Two-thirds of the arterial blood via the hepatic artery is diverted to the gastroduodenal, pyloric, supraduodenal and cystic arteries. One has only to compare the arterial blood of the liver with the arterial blood sent to the spleen or kidney, the latter two organs performing their functions in the presence of an adequate or ample oxygenated blood. The liver, on the contrary, performs all of its functions upon the blood that is essentially nonoxygenated, as the liver cells receive blood only from derivatives of the portal vein, the hepatic artery supplying the walls of the blood vessels, the bile ducts and the liver capsule. It has not been definitely demonstrated whether any of the hepatic arterial blood goes beyond the interlobular septa; such transference of material from arterial blood to hepatic cells must

be by osmosis and not by anatomic arterial canaliculi as the hepatic artery has no paralleling veins. Again, the venous blood entering the liver is diverse in its source and different in quality from ordinarily considered venous blood. The portal blood represents (1) from one-sixth to one-eighth of the splenic venous blood, deprived of most of its oxygen after passage through the spleen; (2) the mesenteric venous blood is surcharged with products of absorption from stomach, duodenum, pancreas, small intestine and the major portion of the large intestine. On the other hand, the hepatic veins carrying the blood from the liver to the vena cava, in addition to the above moities, has the venous equivalent of the hepatic arterial blood.

The functions of the liver are diverse and obscure but certain activities may be predicated at this time. The liver concerns itself with (1) the maintenance of a proper blood sugar level through the glycogen metabolism.^{17, 18} In this activity there is apparently a reciprocal relationship with the pancreas.¹⁹ (2) The metabolism of protein as evidenced in the formation of urea, purin and amino-acid metabolism and the ammonia balance; (3) the metabolism of fats—the liver acting as a reservoir for fat storage; (4) the secretion and excretion of bile. In this connection its activity is manifested as a filter capable of removing broken down cellular detritus coming from the spleen; (5) elaboration of fibrinogen; (6) depurative function in destroying biotic elements and detoxifying biochemic or gastrointestinal deliterants.

The liver possesses marked regenerative properties. Since every liver cell is identical with its fellow it follows that there is no specialization of special cell groups for varied or specific purposes. Each cell the moment it is fully formed can function with all its properties. No other organ in the body exhibits such pronounced regenerative capacity. The rate of the repair of the liver is so rapid that fully 800 grams of liver grows in seven to nine days.²⁰ Mann²¹ was able to excise 70 per cent of the liver with complete regeneration within a few months, the regeneration being so rapid and ample that there was no liver deficiency produced. In addition, a sufficient number of bile ducts could be ligated so that 70 per cent of the biliary secretion was occluded without any impairment of liver function. The ligated portions of liver tissue undergoing connective tissue deposition and producing the histologic picture of biliary cirrhosis while the unligated portion of the liver underwent hyperplasia and regeneration so that hepatic function was undisturbed. MacMaster and Rous²² have determined that three-quarters of the ducts of the liver substance in dogs and monkeys can be obstructed without pigment or cholate accumulation and that tissue icterus did not result when nineteen-twentieths of the liver substance was placed in stasis.

Under stress of additional work other viscera undergo hypertrophy: the liver, however, makes up for deficiency of function by hyperplasia—a biologic characteristic preserved by no other organ in the human body. Any liver degeneration brought about by any offending agent induces two distinct changes in the liver. The one is fibrous tissue replacement, the other hepatic hyperplasia with compensatory degeneration.²³ Widal²⁴ contends that the liver exerts marked protopexic functions in its ability to transform peptones—proteoses and disintegrating protein substances being found in the portal circulation during digestion. In the failure of this function there would escape into the general circulation some of these materials, producing a Crise Hémoclasique, a syndrome due to a disturbance in the colloid balance of the blood and characterized by leucopenia, fall in blood pressure, increased blood coagulability and diminution in the refraction index of the blood serum. The application of this idea to clinical medicine suggested itself as a test for liver deficiencies, in that it would seem probable that the protopexic function would be diminished in liver disease and various hepatopathies might be clinically estimated by the loss of this function. "In the few instances of sudden death following Talma operation Kretz attributed the fatal outcome of the sudden flooding of the circulation with substance which otherwise would have been detoxified in the liver. These deaths must, therefore, be considered analogous to those that occurred in Eck fistula in dogs."²⁶

Central necrosis of the liver is in some way related to pancreatic activity. A liver injured in some way seems to be hypersensitive to trypsin and clinically we have found the coexistence of central necrosis and pancreatic fat necrosis, a condition that has also been observed experimentally. According to Fischler²⁷ death in central necrosis of the liver results from a flooding of the circulation with liver biproducts due to the action of trypsin and represents a death from split protein intoxication.

In studying the collective work of the abdominal surgeons* at the New York Post-Graduate Hospital in connection with gall-bladder surgery we were early impressed with a series of deaths and complications that could in no way be attributed to the factors that ordinarily produce death in this class of surgery. The character of these mortalities or some of the complications which ensued and did not result in death led us to believe that there was a gross disturbance in the protective function ordinarily exerted by the liver. We began to study these cases with greater care from the clinical and biochemic standpoint as well as the occasional necropsy findings.

*Services of Dr. John F. Erdmann, Dr. Edward W. Peterson and Dr. Charles Gordon Heyd.

One ordinarily expects that when a mortality follows an operation upon the external biliary passage that it would be associated with the development of shock, hemorrhage, cholemia, gastric dilatation and later possibly the development of peritonitis, the latter being the most infrequent lethal complication.

Eliminating the deaths that might be properly attributed to any or all of these causes there still remained a small group of mortalities that could not be explained upon the basis of any one of these causative factors. We have been careful to eliminate the possibility of renal complications and in the case groups about to be reported this factor was not present, as the preliminary urinary and blood study had assured us as to the physiologic competency of the kidneys before operation. However, with the development of "hepatic insufficiency" there was manifest the blood and urinary findings highly suggestive of an acute irritative nephritis. These cases represented apparently properly selected individuals capable of sustaining the traumatism of a laparotomy. They all exhibited manifest disease of the gall-bladder or external biliary passages, or of the appendix or of ulceration or cancer of the gastrointestinal tract. We have been able roughly to classify three main types^{28, 29} of clinical conditions that have occasionally followed laparotomy directed to the cure of pathologic affections of the abdomen. The first type presents a clinical picture of a postoperative vasomotor depression of an extreme degree and occurring too late to be interpreted as surgical shock. The patient ordinarily has been behaving quite as usual following an operation of cholecystectomy or drainage of the common duct. At the end of twenty-four to thirty-six hours, without any apparent reason, the patient passes into a pronounced state of vasomotor collapse, with cold, clammy extremities, wet, moist and leaking skin, a very much stimulated mentality and a facial expression not unlike the facies of fear. The condition is not associated with dilatation of the stomach and there has been ample evidence of kidney function. The intravenous administration of a ten per cent solution of glucose, 1000 c.c., every four to six hours, and continuous Murphy proctoclysis with tap water has usually brought about a recovery. It is interesting to note that when this type of complication occurs it has usually been in cases that have had a previous operation upon the gall-bladder, and at the second operation have had drainage of the common duct with palpatory or manual manipulation of the pancreas. For want of a better explanation we have interpreted this type of picture as due to some pancreatic toxin or ferment as the result of the surgical trauma with inadequate liver detoxification.

A second type of clinical picture occurs after a varying period of

time, usually the fifth day, in patients who have had a comparatively simple gall-bladder operation but who have been chronically jaundiced. A normal convalescence has been progressing up to the time of the onset of a slight degree of somnolence. They may or may not have lost large quantities of bile through external drainage. They slowly become stuporous and in the course of twelve to twenty-four hours pass into coma. The temperature rises to 103 or 104; kidney function has been adequate previously. There is no evidence of infection with the abdomen and the condition is not one of dehydration following too rapid loss of bile through the drainage tube. Nor has there been any increase in the obstructive cholangitis if this were present previous to operation. We have here a condition not unlike the coma of cholemia in a patient who is adequately drained and who has had no further increase of obstructive jaundice. We have fed these patients their own bile, either by allowing them to drink it or by giving it by stomach tube and have not prevented the fatal outcome by these procedures. This condition is essentially a coma, occurring in a patient with a diminishing obstructive jaundice. Are we dealing with a frank case of liver exhaustion similar to the terminal stages of a portal cirrhosis or an acute yellow atrophy of the liver?

Less frequently we have observed a third type of clinical picture that supervenes immediately after operations on the gall-bladder. This type is infrequent and it is interesting to note that it has occurred after rather simple types of operations on the biliary apparatus. This lethal complication has terminated, however, a long history of gall-bladder or biliary duct infection. These patients, as a rule, have not been jaundiced. The clinical onset is characterized by the onset of coma almost immediately following operation. The patient ordinarily does not recover from the anesthesia, a fact that should be noted. The temperature rises to 104 or 105, with marked acceleration of pulse, usually subsultus tendinum, earphology and talking delirium, and more rarely marked motor excitation. Chemical tests of the blood before operation demonstrated that kidney function was adequate and within normal limits. Spinal puncture after the onset of coma has revealed an increase in fluid under pressure, cell count of 10 to 15 per cubic mm., with two plus globulin reaction and negative Wassermann examination.

Whether the liver is primarily at fault in the three clinical conditions that I have outlined we do not know. The liver reacts to long continued or habitual toxic irritation by two pathologic processes, one the degeneration of liver cells and the other the proliferation of connective tissue. These processes apparently go on simultaneously, and as to which is secondary is of academic interest only. Certain it is that degenerating areas are replaced by connective tissue and in-

tracellular material, and that by replacement or contraction there is atrophy of liver parenchyma. It does seem reasonable, however, to assume that they are in some way associated with liver dysfunction. In their terminal manifestations they simulate in many ways the clinical conditions that are observed in diseases of the liver where there is a manifest loss of liver function. It is interesting to speculate whether there are not conditions of liver insufficiency which give a variety of minor symptoms, or that may exist without any symptoms for a long period of time by reason of the marked regenerative property of liver tissue. From the viewpoint of surgical prognosis may we not claim that these unrecognized cases of hepatitis are the cause of some of our unexplained mortalities and that contribute much to the morbidity that sometimes follows apparently the most successful type of surgical intervention? We believe that when an infection is once initiated within the abdomen and its course is chronic that the liver reacts in a variety of ways, but always with some degree of hepatic degeneration, and that in a certain proportion of cases surgical intervention in these cases is associated or followed by death due primarily to hepatic insufficiency.

PATHOLOGIC DISCUSSION (DR. MACNEAL)

The liver, as has long been known, is subject to acute purulent inflammations, secondary to severe purulent disease in the intestinal tract or in the gall-bladder and bile ducts. In the former instance the infectious agent evidently passes into the tributaries of the portal vein, frequently with evidence of thrombophlebitis, and reaches the branches of the portal vein in the liver substance, giving rise to multiple abscesses. When the primary disease is in the bile passages, on the other hand, the infection appears to ascend along the tributaries of the hepatic duct and the lymph channels accompanying these ducts, giving rise to multiple abscesses similarly distributed as in the first instance, but often containing brownish pus discolored by admixture of bile.

It is also well known that the liver is subject to very profound alteration of its structure as a result of slowly progressive inflammatory change, finally resulting in great diminution of the specific liver parenchyma and a more or less marked increase of the fibrous tissue of the capsule and the interlobular trabeculae. The etiology of these changes, which are designated by the general term, cirrhosis, is still somewhat obscure. In the atrophic cirrhosis of Laennec, the liver may become very small before death takes place. Here the injury is thought to be derived from the digestive tract, reaching the liver through the portal vein, and in some instances alcohol appears to have acted as the toxic agent. Contrasted with this is another well

defined type of cirrhosis, which follows upon chronic bile stasis and prolonged inflammation of the bile passages, known as biliary cirrhosis. Here there results an early interlobular and intralobular overgrowth of connective tissue, proceeding from the vicinity of the bile ducts. After a time such a liver also shrinks and becomes nodular, finally resembling the liver of atrophic cirrhosis.

It is also well established that the liver participates in a great variety of general diseases, especially the severe infections and intoxications. In the acute stage of these one finds a round-celled infiltration of the interlobular connective tissue, degenerative changes in the liver columns, focal necrosis, or even massive necrosis of the liver substance.

Even in the absence of serious disease, the liver tends to become firmer with age, the interlobular and intralobular framework becoming gradually thickened while there is a relative or even absolute diminution of the parenchymatous elements with advancing years.

If the above statements be accepted as a hasty presentation of the better established conceptions in regard to liver inflammations, it will be evident that, in the present discussion, we are dealing with the more delicate shades of hepatic alteration, not those seen at autopsy in the body dead of severe infection, local or generalized, nor those of advanced atrophic cirrhosis, but rather those slighter alterations in the liver which have given rise to no clearly recognizable symptoms or signs, but may be regarded as accidental or incidental anatomic findings in patients whose abdomens have been opened on account of active or quiescent disease of variable degrees of severity, affecting other organs. Under such circumstances an etiologic diagnosis of the liver condition is extremely hazardous and only the very bold may be expected to recognize with assurance in an individual instance a clear-cut relationship between the liver changes and the changes in other abdominal viscera. Without additional evidence one should regard the observations only as suggestive of such a relationship. In a field as obscure as this, however, even suggestive observations are of some value.

The liver alteration visible to the eye of the operator is usually an enlargement of the organ with rounding of its margins. The enlargement is often general but frequently the right lobe or a portion of the right lobe near the gall-bladder may be disproportionately enlarged. One may also see opaque bands of fibrosis in the liver substance near the gall-bladder. This enlargement is evidently in part due to excess of fluid in the liver, congestion and edema, especially when there is an active inflammatory lesion in the gall-bladder or in the portal territory. In many instances and especially when the enlargement is localized, it is evidently the result of growth of liver-

substance. Apparently pressure of the body wall and of the internal organs influences to some extent the form of this overgrowth. In a minority of instances, the liver appears smaller and firmer than normal, suggesting an early atrophic cirrhosis. This condition may be regarded as a later stage of the process. Liver changes belonging in this category are so constantly observed in association with disease

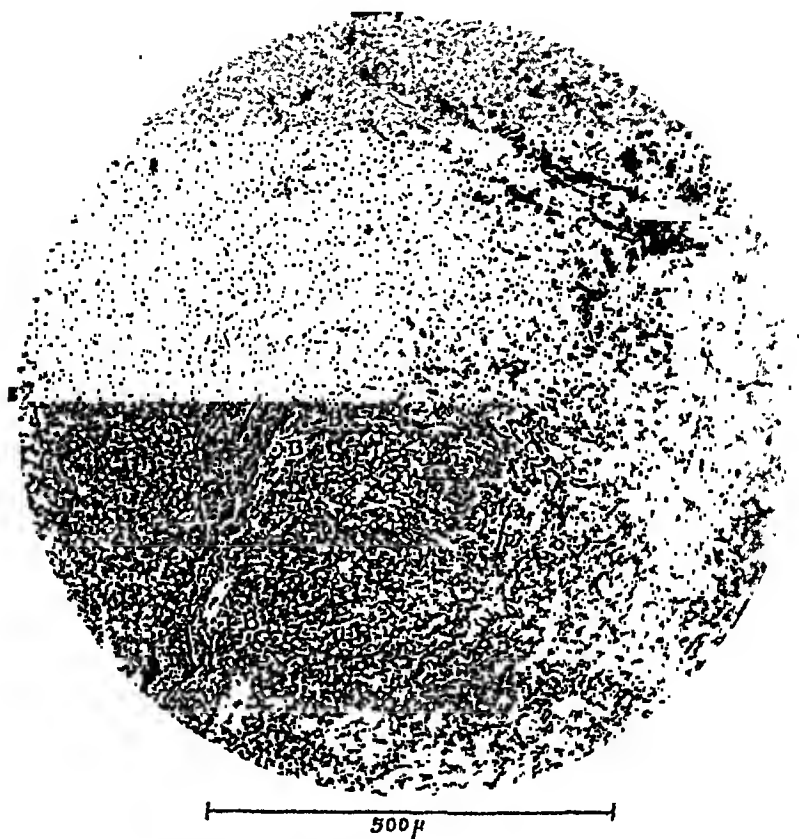


Fig. 1.—No. 25690, male, aged twenty-six: operative diagnosis, appendicitis, acute; operation, appendectomy. Gall-bladder negative. Liver presented diffuse white mottled appearance. Sections of liver showing moderate thickening of the fibrous trabeculae and infiltration with wandering cells, particularly near the bile ducts. Pathologic diagnosis, early stage of biliary cirrhosis. (A) Portal branches. (B) Bile ducts.

of the gall-bladder that a relationship between the two groups may be accepted as established.

Under the microscope one sees, in the soft swollen livers, a general dilatation of the vascular channels and a rich infiltration of the connective tissue trabeculae by lymphocytes and smaller numbers of polynuclear leucocytes. (Fig. 1.) In the more acute inflammations, the endothelial lining of the capillaries may be visibly thickened. In

the irregularly enlarged livers, the microscope reveals definite fibrous thickening of the connective tissue trabeculae and usually an excess of small bile ducts in this tissue. Lymphocytic infiltration of it is more or less marked, apparently depending upon the presence or absence of exacerbation of the inflammatory process. Liver lobules of irregular form and arrangement may be recognized and they doubtless indicate actual growth of liver substance. The firm smaller livers

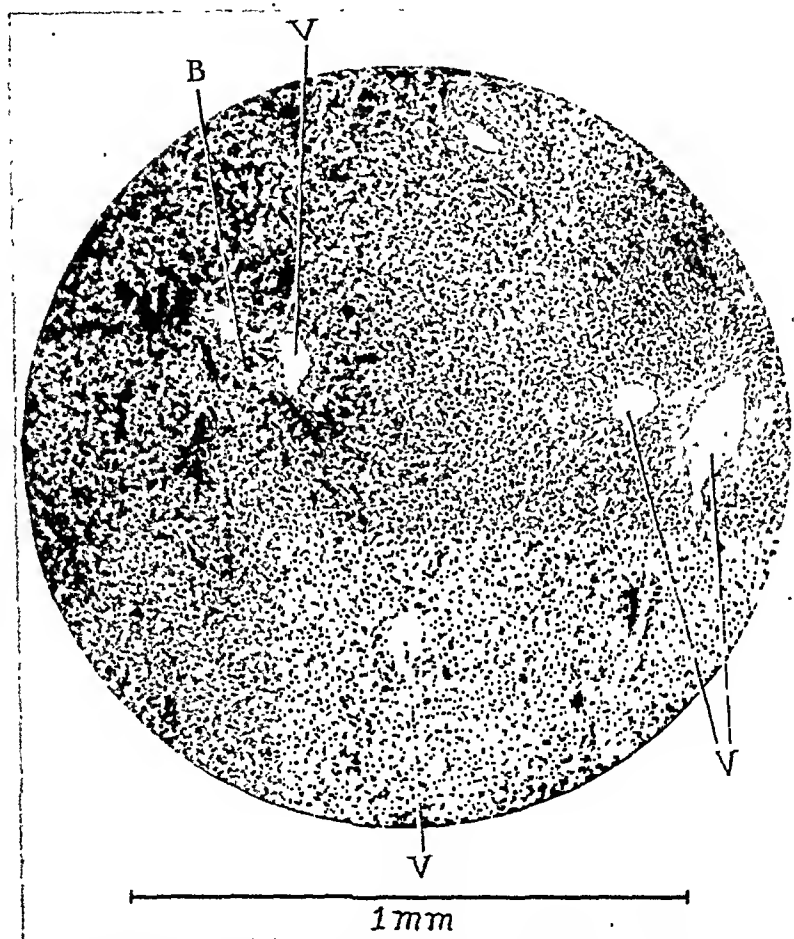


Fig. 2.—No. 25128, female, aged twenty-four: operative diagnosis, appendicitis, chronic; cecum mobile; operation, appendectomy, resection. Gall-bladder negative except for more than normal vascularization. Sections of liver show considerable thickening with trabeculae of Glisson's capsule. Fibrous tissue is dense and hyaline, contains only a moderate excess of round cells. There is a moderate amount of brown pigment in the liver cells. The picture resembles the early stage of biliary cirrhosis but the hyaline character of the trabeculae shows that the process has existed for many months. Pathologic diagnosis; moderate biliary cirrhosis. (B) Bile ducts. (V) Portal branches.

reveal, under the microscope, a still more marked excess of fibrous tissue in the trabeculae. (Fig. 2.) Here the lobules may appear compressed with only narrow vascular channels. One may willingly agree that these three pictures represent stages of a single process, beginning with an acute phase of congestion, edema and exudation, going on to hyperplasia of liver tissue with repeated subsidence and recrudescence of the acute phase and eventually leading to marked over-

production of connective tissue, by contraction of which the parenchyma becomes irregularly compressed (Fig. 3). It should be noted, however, that even when the appendix has shown evidence of prolonged severe inflammation with adhesions all about it, or when the gall-bladder has been the seat of similar long standing severe inflammation, the liver has not exhibited the very advanced diffuse alteration characteristic of atrophic cirrhosis (Fig. 4). Indeed the liver appears

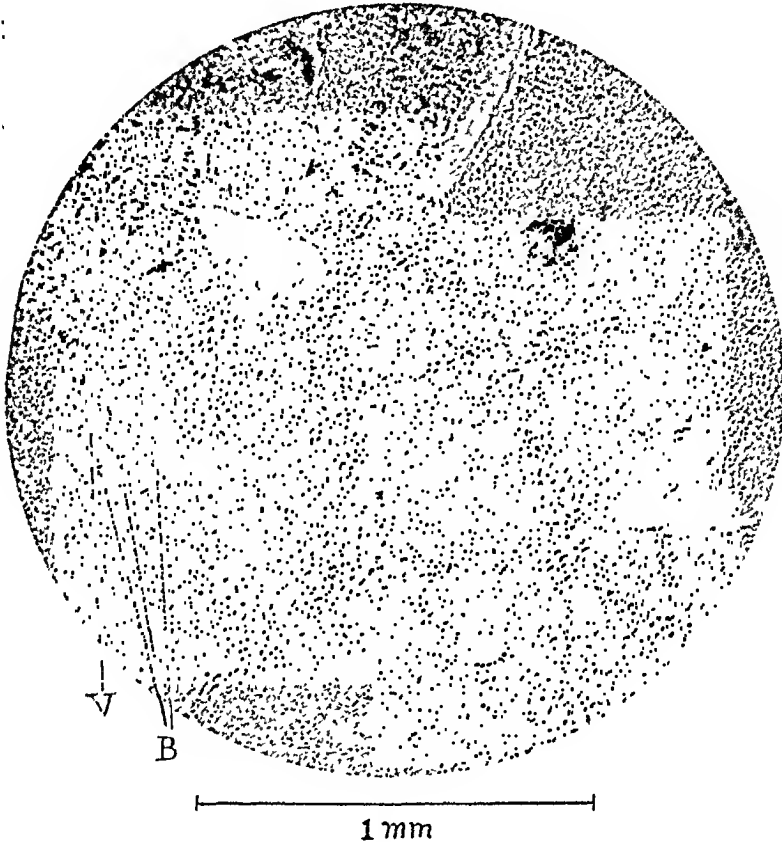


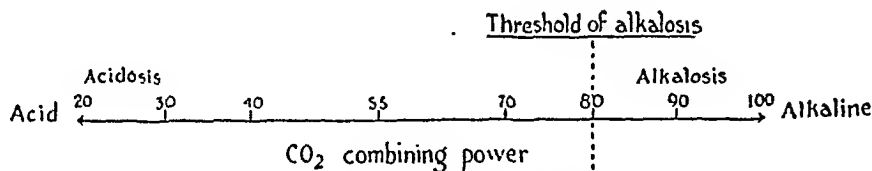
Fig. 3.—No. 24682, female, aged fifty: Operative diagnosis, cholecystitis, sub-acute; cholelithiasis, appendicitis, chronic; operation, cholecystectomy, appendectomy. Gall-bladder opaque, white walls, markedly thickened; contains 150 calculi sulphur colored. Sections of the liver show marked thickening of the fibrous trabeculae and occasional dense collections of round cells. Hyperplasia of bile ducts. Pathologic diagnosis, chronic interstitial hepatitis bearing some resemblance to that of Laennec's cirrhosis. (B) Bile ducts. (V) Portal branches.

to withstand remarkably well the insults repeatedly coming to it from these sources, so that one is impelled to look farther for the explanation of the origin of more serious hepatic disease. The importance of general disease, such as syphilis, tuberculosis and prolonged suppurations of distant parts as causes of liver pathology, is not, therefore, eclipsed by the observations on hepatitis now under consideration. It is, however, quite possible that chronic gall-bladder suppuration might, of itself, induce a high grade of cirrhosis, but certainly such an association appears to be relatively infrequent.

BIOCHEMICAL DISCUSSION (DR. KILLIAN)

We have been fortunate in being able to study from a chemical point of view the last six cases of the third clinical group of Dr. Heyd. Of outstanding interest has been the observation that these patients

TABLE I



An increase in the carbon dioxide combining power toward 80 indicates an alkalosis; the reverse, an acidosis.

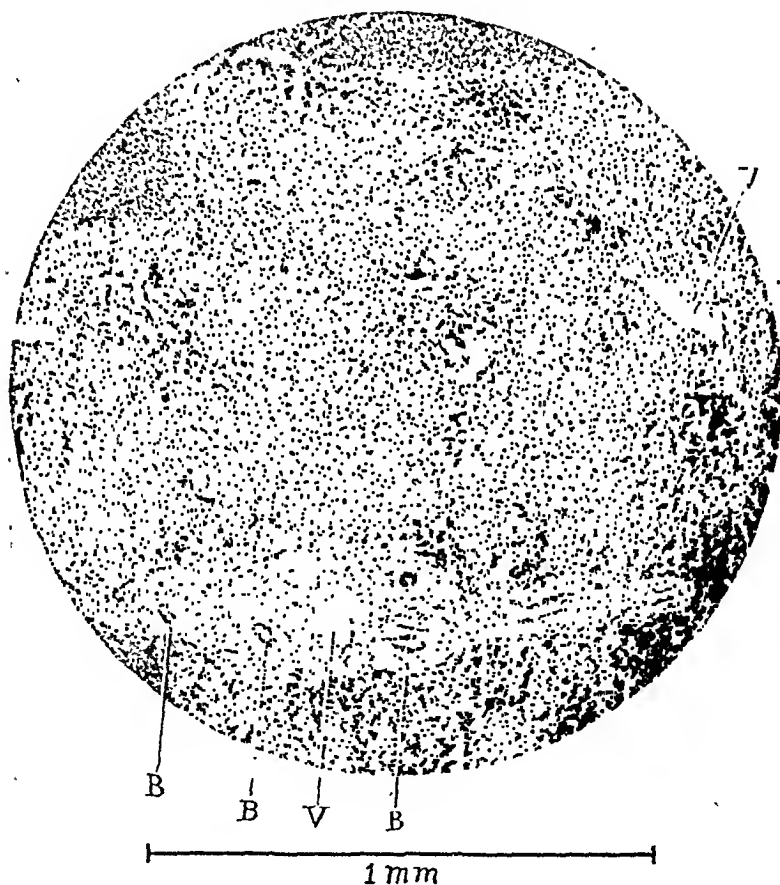


Fig. 4.—No. 26893, male, aged forty-six: operative diagnosis, cholecystitis, subacute; cholelithiasis, appendicitis, subacute; operation, cholecystectomy, appendectomy. Gall-bladder dirty brown color; about 400 fine sulphur colored calculi. Pancreas, abnormal hardness. Sections of gall-bladder muscle bundles irregularly thickened; in some places the muscle layer attains thickness of 1 mm. Sections of liver show very definite increase in fibrous tissue in the trabeculae of Glisson's capsule. The fibrous tissue is dense and evidently of considerable standing; contains an excess of round cells with very conspicuous bile ducts. Pathologic diagnosis, chronic interstitial hepatitis, evidently of biliary origin. (B) Bile ducts. (V) Portal branches.

show a carbon dioxide combining power markedly increased above the normal, representing 81 to 100 volumes per cent (Table I). This has not been due to the previous administration of alkalis and the

TABLE II
CHEMICAL BLOOD CHANGES IN DISEASES OF LIVER AND GALL-BLADDER

NO.	PATIENT	AGE	SEX	NON- PROTEIN N	MG. PER 100 G.C.		URIC ACID	SUGAR	DIA- STATIC AC- TIVITY	PER CENT				REMARKS
					UREA N	CHOLE- STEROL								
1.	M.D.	38	F.	54.7	10.1	4.2	0.093	20.4	0.146		0.53	47.1		Cholecystitis. No jaundice.
2.	N.M.	52	F.	46.0	22.1	4.1	0.227				0.428	98.0		Cholecystitis. 24 hours after operation. Na H CO ₃ given by rectum.
3.	M.K.	60	M.	38.5	19.1	3.6	0.093				0.350	80.5		Na H CO ₃ discontinued. HCL by mouth.
4.	L.Z.	57	F.	45.0	16.3		0.150		0.290	0.357		49.0		One week later.
5.	H.T.	28	F.	40.5	11.9	3.7	0.082	20.4	0.952	0.396	0.475			Ca. of liver. Marked jaundice.
				40.7	11.0	3.7						46.2		Cholecystitis.
6.	A.J.	42	F.	37.5	11.7	3.8	0.091	16.0	0.545					Marked jaundice. Obstruction of common bile duct.
				44.1	12.3	3.7	0.098		0.192	0.364				Two weeks after removal of obstruction.
														Three months later. Patient improved.
														Very slight jaundice.
7.	M.E.	41	F.	37.4	9.0	3.1	0.100	21.4	0.300			47.1		Cholecystitis and cholelithiasis.
8.	E.S.	50	F.	36.3	10.1	3.4	0.104							Jaundice.
9.	V.S.	41	F.	32.7	7.5	4.1	0.084			0.449				Cholecystitis. No jaundice.
10.	A.M.	43	M.	38.5	14.8	5.3	0.180	26.4	0.154					Cholecystitis.
11.	A.P.	37	F.	29.7	10.0	4.3	0.121	24.6	0.216			65.3		Cholecystitis and cholelithiasis.
12.	B.M.	60	F.	21.9	8.9	2.4	0.148	14.8	0.204			55.7		Ca. of liver. Marked jaundice.
									0.313					

condition has been designated chemically as an alkalosis. So far as its fatal outcome is concerned it is much more pernicious than an acidosis. Of the six cases recently studied four terminated fatally and all of these were instances of chronic disease of the gall-bladder with simple operations. It has been determined that this increased carbon dioxide combining power is associated with a decreased hydrogen-ion concentration, and hence a true alkalosis exists.

For the observation of the chemical changes in the blood coincident with diseases of the liver and gall-bladder, seventeen cases have been studied, of which twelve are reported in the table (Table II). It will be seen that in many of these cases the nonprotein nitrogen exceeds the upper normal level of 30 mg. per 100 c.c. The urea nitrogen on the contrary does not show a corresponding increase, in fact, in some instances it is subnormal. These findings would indicate a corresponding increase in the rest nitrogen. Little is known concerning the nature of the compounds constituting the rest nitrogen of the blood, but we believe an intensive study of the nonprotein nitrogen partition of the blood will tell us more than we know at the present time concerning liver function. The normal uric acid content of the blood is from 3 to 4 mg. per 100 c.c. In a few instances an increase in the uric acid is noted. There are many reasons for attributing this increased uric acid to a mild secondary impairment of renal function. The normal blood sugar ranges from 0.09 to 0.120 per cent. In many cases of gall-bladder disease we find a mild hyperglycemia from 0.140 to 0.200 per cent. Associated with this increased blood sugar is an increased activity of the blood diastase. It is well known that the pancreas regulates the activity of this blood enzyme and an inhibition of pancreatic function entails an abnormal diastatic activity. Apparently, then, the increased blood sugar sometimes encountered in gall-bladder disease may find its cause in an associated disturbance of pancreatic function. On the other hand, in two cases we have found slight hypoglycemias. The reason for these hypoglycemias remains still a baffling question.

An increase in the cholesterol content of the blood has been observed in cases of obstruction in the biliary tract whether this obstruction is due to calculi, new growth or other mechanical means. The findings of Case 5 are of particular interest in this connection. At the time of entrance to the hospital this patient showed a blood cholesterol of 0.952 per cent and this was associated with a pronounced jaundice. At laparotomy it was found that during a previous operation for gall-bladder disease the common bile duct had been resected. The gall-bladder was drained by means of a rubber tube into the duodenum. Two weeks later the cholesterol had diminished to 0.545 per cent and

three months after operation had reached 0.182 per cent. At this time the patient showed but slight evidence of jaundice.

Since the liver has been regarded by some authorities as the site of formation of the fibrinogen of the blood, the fibrin content of the blood was studied in some cases. A few of these results are reported in the table. The normal fibrin content of the blood varies from 0.2 to 0.5 per cent. It will be seen that the figures fall well within the normal limits. These findings are of interest inasmuch as many of these cases manifested a delayed coagulation time. The calcium content of the blood sera of these patients was also determined. The calcium was found to be normal. This fact, however, does not contraindicate the use of dilute solutions of calcium chloride to decrease the coagulation time because for the process of clotting ionizable calcium is essential. When the total calcium of the blood serum has been determined there is no means of ascertaining the amount of this element that is ionizable. The chloride content of the blood was found to be normal except in those cases showing an increased CO_2 combining power. Here a decrease of the chloride concentration was noted.

BIBLIOGRAPHY

- (1) *Heyd, C. G.*: Long Island Medical Journal, January, 1923. (2) *Babcock W. W.*: Jour. Am. Med. Assn., 1915, lxxv, 17. (3) *Peterman, M. G.*: Surg., Gynec. and Obstet., July, 1923. (4) *Heyd, C. G.*: Ann. Surg., January, 1924. (5) *MacCarthy, W. C. and Jackson, A.*: Minn. Med., 1921, iv, 377. (6) *Peterman, M. G., Priest, Walter S., Jr., and Graham. Everts, A.*: Arch. Surg., January, 1921, ii, 92. (7) *Feuterer, G.*: Berl. klin. Wehnsehr., 1899, xxxvi, 58. (8) *Charcot*: (Ehret, H. and Stolz, A.) Mitt. a.d. Grenzgeb., v. 6, 7, 8, 10. (9) *Heyd, C. G.*: Post-Graduate, March, 1913. (10) *Ascl, Werelius*: Jour. Am. Med. Assn., 1922, lxxix, 535. (11) *Mayo, W. J.*: Surg., Gynec. and Obstet., 1921, xxxiii, 469. (12) *Mayo, W. J.*: Ann. Surg., 1918, lxxviii, 183. (13) *Hess and Serege*: v. Volkmanns Sammlung klin., Vortrage, N. F., 1900, 576. (14) *Silvestri*: Gazz. d. osp., 1905, xxvi, 570. (15) *Deaver, John B.*: Surgery of Upper Abdomen, Phila., 1909, Blakiston, i, p. 45. (16) *Sobotta, J., and McMurrich, J. P.*: Atlas and Textbook of Human Anatomy, 1909, W. B. Saunders, ii, p. 62. (17) *Mann, F. C. and Magath, Thomas B.*: Sect. Patho. and Phys., Am. Med. Assn., 1921, xxix, 41. (18) *Mann, F. C., and Magath, Thomas B.*: Arch. Int. Med., 1922, xxx, 171. (19) *Mann, F. C., and Magath, Thomas B.*: Arch. Int. Med., 1923, xxxi, 797. (20) *Rost, F.*: The Pathological Physiology of Surgical Diseases, Phila., 1923, Blakiston, p. 115. (21) *Mann, F. C.*: Am. Jour. Med. Sc., 1921, clxi, 37. (22) *MacMaster, P. D. and Rous, P.*: Jour. Exper. Med., 1921, xxx, 731. (23) *Mayo, W. J.*: Jour. Am. Med. Assn., 1918, lxx, 1361. (24) *Feinblatt, Henry M.*: Jour. Am. Med. Assn., 1923, lxxx, 613. (25) *Rollston, H. D.*: Diseases of the Liver, Gall Bladder and Bile Ducts, New York, 1914, Macmillan and Co., p. 37. (26) *Adamski, J.*: Dissert. Munchen, 1912, C. Wolf and Sohn. (27) *Fischler, F.*: Springers Verlag, 1916. (28) *Heyd, C. G.*: Surgical Clinics of North America, New York Number, Feb., 1923. Saunders and Co. (29) *Heyd, C. G.*: Trans. Amer. Gastro-Enterol. Assoc., 1923, xxxvi.

(For discussion see p. 479.)

ACUTE PANCREATITIS*

BY LEWIS F. SMEAD, M.D., TOLEDO, OHIO

ACU TE surgical conditions of the pancreas may have two general divisions; those dependent upon factors peculiar to and inherent in the digestive functions of the pancreas and those definitely of an inflammatory nature. In the first group we have acute hemorrhagic pancreatitis, better designated as acute pancreatic necrosis. It is a condition not essentially inflammatory. The more severe cases end quickly in death or in recovery after massive gangrene, sloughing and suppuration. The milder cases recover promptly by a process of absorption and fibrosis. In the second group we have acute pancreatitis which is definitely inflammatory in character. It is comparable to the suppurative and nonsuppurative inflammations of the parotid gland.

It is the purpose of this paper to consider these two types of pancreatitis and to report cases of each.

CASE 1.—Mrs. M. S., a moderately heavy individual, age forty, began two weeks before the onset of her more serious trouble to have attacks of moderate pain in her upper abdomen. Three days before her death the patient suddenly developed a very severe epigastric pain with vomiting and continuous eructation of gas. The pain was more severe than the average gall-bladder colic and was not easily relieved by morphine. She had never had any previous attacks suggesting biliary disease but had been troubled with gas and pain after eating.

The patient was apparently in great distress. Her skin was cold, clammy, and cyanotic. The respirations were frequent but the lungs were clear. The temperature was 96; and pulse 150, scarcely palpable at the wrist. The abdomen was moderately tender in the whole epigastrium but more so on the right. There was only slight rigidity. No tumor was present in the upper abdomen but there was some distention. The white blood count was 33,000 and the polymorphonuclear cells 90 per cent. No sugar was present in the urine.

When the abdomen was opened under local anesthesia a large amount of coffee-colored or blood-tinged fluid escaped and many small areas of fat necrosis were visible in the omentum. The patient's general condition was so precarious that exploration was impossible. Drains were inserted and the abdomen closed. Death occurred in six hours and autopsy was refused.

Operation was ill-advised in this case. Every form of treatment will be found unsuccessful in the fulminating cases of pancreatic necrosis.

CASE 2.—Mrs. H. P. age twenty-three, quite fat and the mother of three children. During the summer of 1917 she had numerous attacks of upper abdominal pain. On Nov. 10, 1917, while at work, she was taken with very severe pain in the epigastrium and vomiting. The patient came under observation at the hospital on Nov. 12. Her temperature was 99.4, pulse 110. She was quite ill but

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

not in great shock. The abdomen was distended and tender but no tumor was palpable in the epigastrium. There was no jaundice and no sugar in the urine.

Within the abdomen was found a large amount of brownish red fluid, and in the omentum and over the peritoneum were many areas of fat necrosis. Below the pylorus, overlying the head of the pancreas, extending along the greater curvature of the stomach and even involving the transverse colon, was a large, hard, nodular mass with many clots and much gangrenous looking tissue. On palpation it felt not unlike a large carcinomatous mass. The lesser peritoneal cavity was opened with difficulty because of the extensive involvement. A finger was pushed into the mass in several places and into the region of the head of the pancreas. Large gauze and rubber tube drains were inserted to the mass and into the lesser peritoneal cavity. Many stones were removed from the gall-bladder and that organ drained.

The patient reacted well. The drainage from the region of the pancreas was enormous in amount, very purulent and very irritating. There was much sloughing of fatty tissue. With the separation of the larger pieces there were frequent severe hemorrhages. The latter occurred at intervals for weeks and nearly cost the patient her life. One hemorrhage came on as late as the tenth week after operation and was so severe that the patient's pulse reached 160. The temperature ranged from 101 to 104, and the patient was very septic for weeks. Frequent bowel movements were troublesome for the first ten days after operation but were due to a colitis and not to a pancreatic insufficiency. She showed no sugar in the urine at any time. The patient left the hospital after sixteen weeks with a pancreatic fistula which closed within a few months.

In 1923 the patient was seen with an acute cholecystitis. A stone was removed from the cystic duct and she has been entirely relieved. At this operation the adhesions in the upper abdomen were so dense that little could be made out regarding the pancreas. At this time she had no sugar in the urine and the blood sugar was normal.

Of course it is perfectly evident that such a case as this could not recover without operation.

CASE 3.—Mrs. G. L., stout woman, age forty-three, and the mother of two children. Seventeen years ago, after the birth of a child, she had a severe attack of pain and soreness in her upper abdomen. Since that time, at intervals of a year or so, she has had a series of mild attacks of epigastric pain followed by a severe attack, usually with mild jaundice. For weeks before her admission to the hospital she had been having mild attacks with slight jaundice, vomiting, much gas, indefinite food distress, and a loss of twenty pounds in weight. Two weeks before coming to the hospital she had a severe attack. On careful questioning she was unable to say that it was different or more severe than the four other serious attacks which she had experienced.

At the time of her operation she was entirely free from pain, but had a little soreness in the gall-bladder region. There was no palpable mass. The temperature and pulse were normal.

On opening the abdomen the gall-bladder contained many stones and was considerably thickened. In the head of the pancreas was a hard, dark, nodular mass about three inches long. There was no free fluid in the peritoneal cavity. In the gastrohepatic omentum, just above the pylorus, was a large confluent area of fat necrosis. The gall-stones were removed and cholecystostomy done. Drains were placed to the pancreas and to the lesser peritoneal cavity. The mass in the pancreas was not disturbed.

This was considered to be a case of acute hemorrhagic pancreatitis which

had occurred two weeks before operation and from which the patient was recovering.

Following the operation no discharge came from the pancreas and the gall-bladder fistula closed in three weeks. She remained well for four months when she again had several mild attacks of pain followed by a very severe one. Two weeks after this her abdomen was again opened. There were no stones in the gall-bladder or common duct. There was no new area of pancreatic necrosis and the former area had undergone absorption and fibrosis. It was still palpable in the head of the pancreas but was much smaller and was firm and not modular. There was no free peritoneal exudate and no evidence of fat necrosis, new or old.

The gall-bladder was removed as the probable direct or indirect cause of the trouble and she has remained entirely well. Since the removal of the gall-bladder and the exploration of the gall ducts this patient has had two attacks similar to her old trouble. They have consisted of several mild attacks of pain and soreness followed by a severe attack. There has been no jaundice. In other words, this patient has not been relieved by cholecystectomy.

Twice during her first admission she had a trace of sugar in her urine but there has been none since.

CASE 4.— Mrs. M. T., a rather slightly built woman, thirty-one years of age, the mother of two children. Two weeks before her present illness she had a severe attack of tonsillitis followed by soreness in her knees and ankles. Within a few days she was taken with a sudden, severe pain in the epigastrium, radiating to the back and with vomiting. Similar attacks continued for two weeks, occurring every two to three days and lasting several hours. There was moderate temperature, continuous soreness and the patient felt quite ill. She was admitted to the hospital after a severe attack lasting three days. Her temperature was 99.4, pulse 116, and the white blood count was 12,000. The whole upper abdomen was moderately tender. The skin was dry and slightly jaundiced. The urine contained no sugar. The symptoms and physical signs suggested acute cholecystitis but the diagnosis was uncertain. She was in much pain, looked ill, and was losing ground.

On opening the abdomen there was no free fluid. The gall-bladder was slightly thickened and edematous but contained no stones. About the common duct and in the retroperitoneal tissue around the head of the pancreas there was much edema. The pancreas itself was swollen to several times its normal size. It was not dark or nodular and there was no fat necrosis.

Cholecystostomy was done and drains were placed to the pancreas and to the lesser peritoneal cavity. The pancreatic tissue was not incised but the peritoneum about the head of the gland was opened with the hope of draining the edematous retroperitoneal lymph spaces. Bile drainage continued for three weeks but there was no purulent discharge from the pancreatic area.

The patient had no more attacks of pain and her general condition improved promptly. She has remained entirely well to the present time.

The etiology and pathology of acute pancreatitis is important because an understanding of it will be necessary before we shall be able to lay down the principles on which the condition may be intelligently treated.

In the inflammatory type of acute pancreatitis the infection reaches the pancreas most frequently along the lymphatic channels from a diseased gall bladder or from a peptic ulcer. It may also reach the pancreas as an ascending infection through the lumina of the bile

and pancreatic ducts. Less commonly it is carried by the blood from some distant focus or during a general systemic infection. Involvement by contiguity from an adjacent infection, usually a peptic ulcer, is possible.

The acute inflammatory type of pancreatitis is of less surgical interest than pancreatic necrosis because it is not often operable. The cases occurring in mumps and as catarrhal jaundice should not be operated. When operable the treatment of the inflammatory type of acute pancreatitis consists in prolonged drainage of the gall-bladder of common duct, removal of all sources of infection, as a diseased gall-bladder, an appendix, or a peptic ulcer. Pancreatic abscesses must be drained and an occasional pancreatic stone removed. It has been suggested that the pancreas be set at rest by giving an antidiabetic diet and by the administration of alkalies and also that pancreatic ferments be given to carry on pancreatic digestion.

Acute hemorrhagic pancreatitis is a sudden, massive necrosis of a considerable part of the pancreas. The area of necrosis is sharply separated from the uninvolved tissue and is accompanied by hemorrhage into the pancreas and surrounding lymph spaces. The peritoneal cavity, during the acute stage, contains a brownish or bloody exudate. In the fat about the pancreas, in the omentum and elsewhere, there are yellowish white areas of fat necrosis. These are due to the escape into the tissue of the fat splitting ferment of the pancreas. Fat necrosis indicates "some grave alteration of the pancreas," and is always present in acute hemorrhagic pancreatitis.

The real nature of pancreatic necrosis has not been determined. It has generally been considered to be due to the digestive action of the trypsin of the pancreas set free by some injury to that organ of a chemical or bacterial nature. The trypsin exists in the pancreas only as trypsinogen, a substance with no power to injure tissue. Within the duodenum, however, the trypsinogen is converted by the action of enterokinase into trypsin. The real problem then, on this theory, is to find what converts the trypsinogen into trypsin while still in the pancreas and how that agent reaches the pancreas.

Experimentally, acute pancreatic necrosis has been produced by injecting into the pancreatic tissue and into the pancreatic ducts certain irritating substances such as acids, alkalies, toxins, suspension of bacteria, artificial gastric juice, zinc chloride, ferments, bile salts, etc. On the other hand, the condition has been produced by the ligation of the pancreatic duct during active digestion and by direct trauma to the pancreas. It should be noted that in the pancreatitis produced by the ligation of the pancreatic duct and by trauma, bile, duodenal contents, and infection can play no part.

In man the only substances which can reach the pancreas by its

ducts are bile and duodenal contents. If bile is to enter the pancreatic duct from the common bile duct, the two channels must join before they enter the duodenum. We must also assume that something obstructs the diverticulum of Vater below their junction thus shunting the bile into the pancreatic duct. Opie reports a case in which a small stone in the diverticulum of Vater produced such an obstruction and Archibald suggests that it is due to a spasm of the sphincter at the diverticulum of Vater. He also suggests that the spasm may be due to some irritation such as an ulcer or hyperacidity.

Flexner has shown that bile, rich in bile salts, especially taurocholate, is more irritating to the pancreas than normal bile. He has also demonstrated that mucin in bile tends to lessen its irritation. It has also been proved that infected bile will cause pancreatitis when normal bile will not.

Given then an obstruction at the diverticulum of Vater, a concentrated, infected bile, poor in mucin, and an increased pressure within the ducts and we have the stage set for an attack of acute hemorrhagic pancreatitis according to the bile theory.

This theory undoubtedly does explain some cases of pancreatic necrosis but not all of them. It cannot explain cases when the common bile duct and the pancreatic duct enter the duodenum separately; and even if they do join in the diverticulum of Vater it is probably rare for the anatomic condition to be such that a small stone or a spasm of the sphincter can convert them into a continuous channel. Granting proper anatomic arrangements and it is still doubtful, according to recent experiments, whether sufficient pressure is exerted in the duct of Wirsung to drive normal bile into the pancreas with enough force to cause pancreatic necrosis. However, while proper anatomic and physical conditions may be rare, yet the cases of pancreatic necrosis are equally rare and we have in addition to the action of normal bile that of the more irritating concentrated bile and of the infection it carries.

Closely allied to the bile theory of pancreatitis is the theory that the injection of duodenal contents into the pancreatic ducts might be responsible for the condition. It contains ferments capable of converting trypsinogen into trypsin and experimentally when injected into the pancreatic ducts it will cause pancreatic necrosis. Against this theory is the fact that it has been impossible to drive fluids from the duodenum either into the duct of Wirsung or Santorini. However it has been suggested that when the common bile duct and the duct of Wirsung unite in the diverticulum of Vater, a gall-stone passing into the intestine might so paralyze the sphincter as to allow a reflux of duodenal contents from the duodenum. In certain cases of acute pan-

creatic necrosis gallstones are known to have recently passed into the duodenum.

Another theory of the etiology of pancreatic necrosis and one which fits in well with the clinical circumstances is that the activating agent is an infection entering the pancreas through the lymphatic channels, most commonly through those from the gall-bladder or liver but also through those from the appendix, stomach, or duodenum. The infection is supposed to cause enough injury to the pancreatic tissue to set free a substance capable of activating the trypsinogen and thus starting the process of destruction. In this connection it should be noted that leucocytes and bacteria within the pancreas may produce a ferment with the power of activating the pancreatic secretion. The original inflammation is relatively so small as to be entirely lost in the massive process which follows.

Against this theory is the fact that the pancreatitis is not always associated with a demonstrable infection in the gall-bladder or elsewhere and that the passage of an infection from the gall-bladder and other organs through the lymph vessels to the pancreas involves the supposition of a retrograde flow in the lymphatic channels. If we admit the possibility of lymph-borne infection activating the pancreatic secretion we must also admit the possibility of a blood-borne infection doing the same thing. Experimentally of course it has been impossible to produce pancreatic necrosis by infection through the pancreatic lymphatics.

Gallstones and infections of the gall-bladder and gall ducts have been found in a very large percentage of the cases of acute pancreatitis and it seems highly probable that they are an important factor in the etiology. Whether it is due to the bile entering the pancreas or to the infection reaching the pancreas by the lymphatic vessels remains to be decided.

The profound shock and the early deaths occurring in acute hemorrhagic pancreatitis are probably due to the absorption of autolyzed pancreatic tissue. Experimentally when such tissue has been injected into the peritoneal cavity of a dog, shock, early death, and other symptoms, as in acute pancreatic necrosis, have occurred. Of course we must not lose sight of the fact that we have a massive and sudden destruction of tissue in the immediate neighborhood of the large sympathetic ganglia.

The diagnosis of acute pancreatic necrosis is difficult and is usually made at operation or autopsy. It is most often mistaken for acute trouble in the gall-bladder or ducts or for an acute perforation of the stomach or duodenum, occasionally for acute appendicitis or acute ileus.

It is well to remember that there are severe cases and relatively

mild ones. The severe cases with their extreme pain, profound shock, subnormal temperature, cyanosis, coma, and early death have been generally assumed to be typical of acute hemorrhagic pancreatitis and the fact that there are mild cases which cannot easily be distinguished from attacks of cholecystitis, has not been sufficiently emphasized.

There are no pathognomonic signs or symptoms of acute pancreatic necrosis. The cases are often difficult because they frequently occur in patients who have had recurrent trouble in the gall-bladder or stomach and in patients too ill to give definite information.

The pain of pancreatic necrosis comes on rather suddenly and is overwhelming in character. It is continuous but varies in intensity. It is not easily relieved by morphine and the patient seems to be in great distress. It is located in the epigastrium but is often felt across the back. The tenderness and rigidity when seen reasonably early are not so marked or extensive as in perforating ulcer. They are mostly above the navel and extend to the left of the mid-line. The extension of the epigastric tenderness over the mid-line to the left side is an important sign and carefully observed may lead to a diagnosis of pancreatitis. Of course if the case is seen late when peritonitis has developed it will be useless as a specific sign of pancreatitis. When the tail of the pancreas is involved there may be tenderness in the left costovertebral angle. The abdominal respiratory movements are not entirely abolished but deep breathing is impossible. The vomiting is a very constant symptom and is very persistent and frequently associated with much eructation of gas. It is never fecal until general peritonitis has developed. The abdomen is usually flat with some distention above the navel. There is not often a clear cut tumor mass but rather an indefinite transverse resistance in the upper abdomen due to the enlarged, deep-seated pancreas. Early in this condition the temperature is subnormal but later with the beginning peritonitis it is increased. The pulse is weak and the patient shows many more signs of shock and collapse than in perforating ulcer or acute gall-bladder disease. The dull, leaden paleness and sunken features of shock combined with cyanosis give a peculiar appearance. Movable dullness can sometimes be made out in the abdomen although the amount of fluid is usually not sufficient for this. It may be useful to remember that in early perforations of the stomach or duodenum some gas usually escapes into the peritoneal cavity and can with certainty be made out by x-ray. Its presence might easily differentiate between acute pancreatitis and perforating ulcer.

In these very acute conditions of the pancreas sugar in the urine, diarrhea, and the various laboratory tests of pancreatic insufficiency are not of much value from a diagnostic point of view.

The treatment of acute hemorrhagic pancreatitis is surgical. Mild

eases however often recover without operation. The custom of not operating upon cases of acute cholecystitis is undoubtedly responsible for the failure to discover many moderate cases of acute pancreatitis. The object of surgical intervention is to provide drainage for the toxic products of pancreatic degeneration; to avoid the immediate extension of the necrosis and to prevent future attacks.

How much we can accomplish in checking the rapid intoxication in acute hemorrhagic pancreatitis by drainage to the pancreas during the early stages of this disease, we do not know. It has been stated and supported by good experimental work that the bloody peritoneal exudate found at operation is harmless. Incision or blunt punctures into the necrotic pancreas are of doubtful value or expediency. All collections of encysted fluid in and about the pancreas should certainly be evacuated. This will include drainage of the lesser peritoneal cavity. As absorption of toxic material is largely through the retroperitoneal lymph spaces, drainage should be established by incisions through the peritoneum about the necrotic pancreas when local conditions permit. Drainage, of course, is used not only to prevent the immediate absorption of toxic substances but to give exit later to the massive products of gangrene and suppuration which usually develop in the extensive cases of pancreatic necrosis. Whether it is possible by operation to prevent the further extension of this pathologic process we do not know. It is probable that the extent of the necrosis is determined in the first few minutes of the trouble and that no further tendency to extension exists. However, if injection of bile under pressure from the common bile duct into the pancreatic duct is the etiologic factor in pancreatic necrosis, drainage of the gall-bladder or common duct will remove this pressure and prevent the further extension of the pathologic process. Archibald has suggested that the pressure in the common duct may also be relieved by cutting the sphincter which closes the diverticulum of Vater as it is his theory that a spasm of this muscle is an essential factor in the increase of pressure in the ducts.

The prevention of future attacks of acute hemorrhagic pancreatitis consists chiefly in the elimination of infections from the gall-bladder and ducts of the liver, as well as that from a peptic ulcer or a diseased appendix. Whether we believe that the disease is due to injection of bile into the pancreas or results from infection carried to the pancreas through the lymph channels, the infection is an all important factor.

The actual operation for acute hemorrhagic pancreatitis will consist in evacuation of the peritoneal exudate, drainage of the area of pancreatic necrosis and of the lesser peritoneal cavity, incision into any collection of fluid in or about the pancreas and drainage of the

gall-bladder if the patient's condition will permit. Removal of stones from the common duct and excision of the gall-bladder will rarely be justified in acute pancreatitis. However, cholecystectomy is much more certain to prevent further attacks of pancreatitis than cholecystostomy. Drainage of the gall ducts should be prolonged for several weeks if possible. Permanent drainage of the gall-bladder into the stomach or duodenum by cholecystogastrostomy or cholecystenterostomy is not a good procedure for acute pancreatitis. Archibald's operation of cutting the sphincter at the diverticulum of Vater through an opening in the duodenum has not been generally accepted by the profession.

SUMMARY

(1) Acute surgical conditions of the pancreas include the non-inflammatory pancreatic necrosis and true inflammatory pancreatitis.

(2) Acute pancreatic necrosis is probably due to activated pancreatic ferments escaping into the pancreas and surrounding tissue.

(3) The activating agents may be bile, duodenal contents, or infection.

(4) The frequency of gall-stones, and infections of the gall-bladder and ducts is certainly significant.

(5) The cause of the profound shock is absorption of autolyzed pancreatic tissue.

(6) The most helpful diagnostic points are the severity of the pain, the collapse, and the extension of the epigastric tenderness to the left.

(7) The object of surgical intervention is to remove dangerous toxic substances, prevent the extension of the pathologic process, and avoid future attacks.

CARCINOMA OF THE CERVIX ASSOCIATED WITH PREGNANCY*

BY N. SCHILLING, M.D., NEW HAMPTON, IOWA

THAT "educating the public" on the cancer question has not been universally accomplished will be evident from a review of the following history.

About March 1, 1922, Mrs. P. M., a farmer's wife, thirty-two years of age, began to notice a grayish white, watery, vaginal discharge, at times slightly streaked with blood. A little later she experienced some vesical irritation and the discharge became more profuse and distinctly offensive. At irregular intervals the flow of bright red blood almost amounted to a hemorrhage. From March 1 to about June 1, 1922, it was practically constant. After this date, presumably after pregnancy had supervened, there were more or less extended intervals between the bleedings. At one time there was no sign of blood for three weeks. She had backache and pain in the lower abdomen. The pain was intermittent and lancinating in character and it radiated into both hips and thighs. At rare intervals, it was momentarily quite acute. These symptoms continued for ten months. She then contracted a severe cold. The frequent, paroxysmal cough incident to this illness resulted in such violent hemorrhage from the vagina that the family physician was finally called. She confided to him the information that she considered herself about four and a half months pregnant and that she was having a miscarriage. She declared that she had "felt life" several days before. Her doctor, P. H. Hastings of Alta Vista, Iowa, did not find the situation so simple and on January 18, 1923, he kindly afforded me an opportunity to see her.

She was a small gracile blonde of Norwegian parentage. She did not appear to be especially anemic and was fairly well nourished. She complained of weakness, loss of appetite, nausea and pain in the lower abdomen. Her mother had "liver trouble" and died of intestinal obstruction. When quite old her father died of pulmonary tuberculosis. One sister died of "heart trouble" and a brother died of typhoid. She has five brothers and three sisters living and well.

She began to menstruate regularly every twenty-eight days when she was eleven years old. She never experienced any discomfort or pain during her periods.

She married when she was seventeen years of age and bore eight healthy children. Her labors were remarkably easy. She stated that no doctor had ever attended her because none had ever been able to arrive in time.

In 1920 she had influenza for two weeks. She did not make a good recovery from this illness and never fully regained her former strength and endurance. She mentioned this circumstance as an excuse for having disregarded symptoms so striking and significant, which she began to exhibit nearly a year before calling a physician for her present illness.

Inspection and palpation of the enlarged abdomen at once confirmed the diagnosis of a rather advanced pregnancy. There was a profuse and very offensive bloody discharge from the vagina. On bimanual examination the larger part of the vagina was found to be occupied by a cauliflower shaped tumor arising from the anterior

*Read at the meeting of the Austin Flint Cedar Valley Medical Society, held at Waterloo, Iowa, July 10, 1923.

lip of the cervix. It was friable in consistency and when touched it bled freely. I might say that the vaginal examination was unusually difficult, not only on account of the very high position of the cervix and the presence of the large vascular tumor, but more especially because the perineum was intact and quite unyielding. Such integrity of structure and function will appear truly marvelous when we bear in mind that this little woman had in relatively rapid succession eight precipitate labors.

On January 27, 1923, the patient was brought to St. Joseph's Hospital, New Hampton, Iowa. Here she was again carefully examined and so far as we could determine the growth was really local in extent. The mucosa of the vagina was not involved, enlarged glands could not be palpated and the cervix was still movable. The blood pressure was normal and only a trace of albumin was found in the urine. The white cell count was 8,000 and hemoglobin was 75 per cent.

A good share of the responsibility for the immediate management of the condition was assumed by the patient herself and her family. No active intervention could be considered until after the child was viable.

Under the direction of Drs. Wm. L. Brown and Lester R. Parson of Chicago, and Prof. John G. Clark of Philadelphia, 100 mg. of radium were applied to the growth for twenty-four hours. A considerable constitutional reaction followed in due time. However, at the end of about fifteen days the patient's general condition was very satisfactory. The fetus was alive and apparently thriving. The local effect of the radium certainly constituted a striking therapeutic result. A mere remnant was all that remained of the tumor at the end of four weeks.

On March, 27, 1923, severe labor pains began. In spite of two quarter-grain doses of morphine the patient suffered much. At the end of eighteen hours the long, thick-walled cervix barely admitted one finger.

An abdominal cesarean section was done and a live female child delivered. After the removal of the placenta a panhysterectomy was performed. At the conclusion of the operation the patient seemed to be in very fair condition. But soon after having been brought to her bed she suddenly collapsed and died in a few minutes. About three hours later the child also expired.

A result so tragical in its consequences to this young family may well serve as a text for a few clinical reflections.

In the first place it seems almost incredible that symptoms so characteristic of cancer of the cervix could be entirely disregarded for ten months. Moreover, after the most critical interpretation of these symptoms there can remain no doubt that the pregnancy supervened months after the carcinoma was well established.

We may conclude too that results in the treatment of this class of cases will not improve until there is more prompt and intelligent co-operation between patient, family physician and obstetric specialist.

While it is true that our patient ascribed her general loss of strength to the attack of influenza in 1920, the clinical manifestations of cervical cancer were singularly striking and definite in their onset. "The first week in March" was repeatedly and invariably mentioned as the date when the pain in the lower abdomen, the leucorrhea and the irregular hemorrhages from the vagina were first noticed.

Thaler of the Peham Klinik has lately cited figures to show that carcinoma of the cervix is more apt to occur in women who have ex-

hibited a deficient ovarian function as manifested by late appearance of the menses, irregular amenorrhea and an early menopause. Our patient certainly did not conform to this type. It will be remembered that she began to menstruate at eleven and that within fourteen years she had nine children. This tendency of carcinoma of the cervix and pregnancy to coexist in multipara who have had many pregnancies in rapid succession has often been observed. In 1909 John T. Williams wrote that "In the entire literature I have been able to find only eight cases of this clinical combination in primigravida. In the histories of 43 cases I have found the average number of pregnancies to be 6.9, a proportion, of course, much above the average."

Many authors have published their observations on the subject of carcinoma and pregnancy. And a more bewildering and contradictory expression of opinion, on every possible phase of the question, can hardly be imagined. I suppose that this "confusion of ideas" depends on the fact that pregnancy and carcinoma are in themselves contradictory terms. At any rate, the influence of age will render the coexistence of these two conditions comparatively rare. In the busy practice of a life time a physician might be fortunate enough never to see this combination. That the discovery of such a rare clinical situation may depend on mere coincidence is well illustrated by an account published in 1909 by Gräfenberg from the Pfannenstiel Klinik at Kiel. Within a few weeks three cases of pregnancy associated with carcinoma of the cervix were observed and operated, while for many years this complication had not been seen in this Klinik. So at the Chicago Lying-in Hospital and Dispensary, among 24,200 consecutive obstetric cases there was only one complicated by cancer of the cervix. Just lately E. O. Gross has reviewed 224,080 obstetric cases. One in every 1538 was complicated by cervical cancer. Moreover, this observer contends that the complication of carcinoma in pregnancy and labor is five times more frequent than is ordinarily believed. According to his calculation the exact status of this question can be determined only when the cases are observed for a year postpartum. Of 34 cases studied in this way there were 24, or 66.7 per cent, in whom the carcinoma coexisted with the pregnancy. So that the possibility of cancer of the cervix should be borne in mind, not only for a year after a full term gestation and puerperium, but that the same rule should be applied after every interruption of pregnancy. But even on this point opinions are by no means unanimous. Just a few months ago Schweitzer again emphasized the importance of trauma incident to delivery as an etiologic factor in carcinoma of the cervix, while Mason and Konrad have called attention to a "tem-

porary retardation of its growth coincident with involution of the uterus."

Authorities do not even agree on the simple question whether the carcinoma antedates the pregnancy, or whether it generally develops after the pregnancy has become established. Cohnstein found that the malignant process preceded the gravid state in only 17 per cent of his 127 cases. These figures agree practically with those published by Gross only last year. In five or 16.7 per cent of the 34 cases reported it was demonstrated clinically that the carcinoma existed before the pregnancy. It is significant too that in every one of these five cases spontaneous abortion occurred. However, most clinicians agree with John T. Williams, John W. Williams, Blumreich, Keyes, Sarvey and Schweitzer that "in the majority of instances the woman already has a carcinoma and then becomes pregnant." This was undoubtedly the sequence of events in our patient.

The influence of pregnancy on the clinical behavior of cancer of the cervix is a subject still under discussion.

It is true, though, that most observers express the view that "carcinoma of the cervix as a rule, grows with great rapidity during pregnancy." In this connection the classical experiment of Zweifel is often mentioned. "He marked by means of a loop of thread the border line between the healthy and the diseased parts in a case of cancer during pregnancy. A fortnight later the disease had progressed about two fingers' breadths, no doubt a proof of the enormous growing tendency in this case." The case of Simpson is often quoted. "In three months he saw a carcinoma invade cervix, bladder and rectum."

This sweeping statement certainly ignores a considerable and astute minority opinion. Spiegelberg, Noble, Pinard, Varnier, Herbert Spencer, Penris, v. Siebold, v. Graf, Oskar Frankl and A. Meyer are among the authorities who "consider the rapid growth of carcinoma during pregnancy by no means proven."

In view of these conflicting opinions one is fairly driven to the conclusion that there is a comparatively benign and a more malignant type of carcinoma. And it may be assumed that encouraging statistics in a small series of cases depend largely on this circumstance. At any rate, so long as the real nature and the specific cause of cancer remain unknown all arbitrary assertions in regard to its clinical behavior and treatment are obviously "out of order."

On the one hand we are told that hyperemia, vascular and lymphatic hypertrophy of connective tissue incident to pregnancy accelerate the growth and aggravate the symptoms of carcinoma. On the other hand, it is contended that these conditions resist the invasion of malignant disease. It is pointed out that carcinoma thrives in old,

anemie, biologically decrepit, arteriosclerotic, poorly nourished scar tissue, tissue deteriorated by chronic inflammatory processes.

E. O. Gross suggests the inquiry whether the few contradictory but nevertheless authoritative observers whose conclusions may be accepted without doubt, cannot be explained on the different histologic structure of the carcinoma. According to this explanation the medullary type of growth would be considered the rule while the scirrhus form would be regarded as the exception. Years ago Ovi had in mind, no doubt, the same thought when he said that the evolution of carcinoma of the cervix, one could almost say of all cancers, is so variable that it is impossible to affirm, in a given instance, that the evolution was accelerated by the pregnancy. The same view was again emphasized by Friederich Wolf only last year. He states that "in our researches on the efficiency of operative and ray treatment of carcinoma in general," and this may be applied as well to the combination of carcinoma and pregnancy, "it is often observed that there are relatively benign carcinomas and that there are atypical, rapidly growing tumors." As usual C. H. Mayo has some pertinent observations to make on this problem. He has found that "the possibility or rather probability of the cure of cancer can be largely foretold by the pathologist: thus two individuals of the same age with cancer of the breast, stomach or rectum of the same period of growth with the same extent of apparent glandular invasion would have prospects of life following the same operation, very largely according to the presence of fibrosis in the one and its absence in the other."

Bearing in mind the anemia, the loss of strength, the endometritis, the extension of the disease to the mucous membrane of the body of the uterus, the infiltration of the lower uterine segment, the chemical changes in the secretions and the distortion and obstruction of the cervical canal, one would suppose that conception would be prevented, or, at any rate, that if pregnancy did supervene it would be interrupted at an early date. Age, social state, the extent of involvement of the tissues, the type of tumor are all factors which tend to determine the influence of the carcinoma on the probability and on the course of gestation. According to W. Roger Williams, "when the disease is limited to the cervix, gestation relatively often goes on to full term."

Naturally, the prognosis so far as the child is concerned will depend very much on the character of the treatment instituted. A hysterectomy performed immediately after the diagnosis of carcinoma has been made will result, of course, in a high fetal mortality. If the condition is inoperable, and if the child is delivered at or near term its prospects for life are of course relatively good. But Edgar makes the observation that after "cancerous cachexia stillbirths are very

common, while children born alive are very weakly and, in many cases, succumb soon after birth. The toxins which must be present in the maternal blood appear to exert an influence on the fetus which is similar to that observed in tuberculosis." This description tallies accurately with the condition of the child in our case.

At the present time there are few clinicians who would agree with the famous dictum enunciated by Bouilly and approved by Pinard, Varnier, Commandeur and Champetier de Ribes. According to this postulate, "whatever the management may be, a pregnant woman who has a cancer of the uterus is lost." It is obvious that such an attitude would improve the prognosis so far as the child is concerned in many instances.

In a woman who has cancer of the uterus labor is usually a dramatic affair. There is hardly a disaster known to the science of obstetrics that may not happen in this situation. Slow dilatation, uterine inertia, a tedious, painful labor resulting in general exhaustion, laceration of the cervix, extending deep into the parametrium, the bladder and all degrees of hemorrhage, rupture of the uterus, peritonitis, sepsis, missed labor, and absolute obstruction to delivery are all complications that the obstetrician may need to recognize and to treat.

And it should be realized, at once, that these calamities may ensue not only in the course of the more advanced conditions but that they may follow even a slight carcinomatous infiltration of the cervix.

It is often assumed that the pressure and friction of the fetus on the growth during labor causes a dissemination of carcinoma cells resulting in the more rapid growth of the tumor.

It is generally believed that, other things being equal, spontaneous labor is more apt to occur when the posterior lip is primarily involved than when the neoplasm has issued from the anterior lip. The diagnosis of uterine cancer is easy, as a rule. It needs to be differentiated from incomplete abortion, hydatiform mole, concealed retroplacental hemorrhage, benign polypi and fibroids, inflammatory masses, cervical erosions and placenta previa. On three occasions DeLee found "a hard, nodular but not ulcerative condition of the cervix during the middle of pregnancy attended by slight bleedings and fetid discharge, but which were not carcinomatous and which disappeared after delivery."

In a thorough study of the literature I have not found any evidence which would even tend to show that excision of a specimen from the cervix, if done in approved modern fashion, results in any deleterious consequences either to mother or child. Accordingly, before a diagnosis is ventured, every bleeding multiparous woman should be examined with a speculum and if any questionable tissue is found it should be examined by a competent pathologist. And in this con-

nection it is well to bear in mind the old observation that a given pathologic lesion does not always result in a corresponding clinical exhibition of symptoms. So, in a given instance the classical manifestations of carcinoma of the cervix may not appear until it is far advanced. Schweitzer has lately reported two such cases. Although operated rather late, in neither one had there been any hemorrhage.

The same author has observed a sort of parallelism between the stage of pregnancy and the extent of the carcinomatous process. In other words, a carcinoma seen during the second month of pregnancy was found to be just beginning, patients examined about the middle of pregnancy showed more advanced but still local lesions, while in those women who came to examination after the seventh month the carcinoma involved the vagina, the pelvic glands and in one instance the entire cervix.

The early diagnosis of pregnancy associated with carcinoma of the cervix is even more difficult than it is under normal conditions. Hemorrhages due to the carcinoma may, of course, simulate the menstrual flow and on this account the actual cessation of the menses may not be recognized.

Moreover, it is only human that the possibility of a combination so rare may never occur to the clinician. About the only point on which all authorities agree is that the prognosis is extremely grave. "Any kind of treatment may result in the death of both patients" is about the unanimous verdict on this question.

In our case, one of the outstanding clinical features was the fact that after typical symptoms had continued for about a year the condition was still operable. And I might say that the operation was comparatively easy. The test of operability is hard to define. It is generally agreed, however, that when the broad ligaments and pelvic glands are not involved and when the cervix is still movable, hysterectomy is feasible.

But even more problematical than the question of operability is the problem of deciding in a given instance whether labor will deliver the child spontaneously.

Influenced by the striking though temporary result of radiation and by reports of safe deliveries even in inoperable cases we decided to give our patient a test of labor. That this decision contributed to the unfortunate fate of our patients it would be foolish to deny.

In the light of this experience I venture to submit the suggestion that a pregnant woman who has a cancer of the cervix which has been subjected to radiation should not be permitted to go into labor. The hard cicatricial cervical tissue will not yield. At the end of some hours we will have added to our original difficulties an exhausted patient and a mutinous environment.

In a review published a short time ago Cathala and M  rat found only eight cases of cancer of the cervix complicated by pregnancy which had been treated by the application of radium. To these eight cases they add one they observed and treated. Naturally, they do not attempt to formulate any positive conclusions from so limited a number of observations.

But they have thoroughly succeeded in submitting a number of interesting questions. "What are the indications in the face of cancer of the cervix who is six months pregnant? It is clear that at this stage of development the child should be permitted to grow. Is it not possible by applications of radium to cure the neoplasm, or at least to retard its growth? In the majority of instances the child has survived the radiations. But if the radium does not kill the fetus is it not to be feared that it will determine lesions of the brain cells which will compromise the intellectual future of the child? Can one hope to cure the mother, and at the same time spare the life of the child during the early months of gestation? In that case should the radium be applied in large or small frequently repeated doses?" They conclude their interesting contribution by the general statement that the problems presented require for their solution further study and experience.

In addition to the nine cases reviewed by Cathala and M  rat, Gross has reported two operable cases who were subjected to intensive radium treatment. In both patients criminal abortion interrupted the pregnancies. In both instances, rapidly progressive, inoperable local recurrence closed the clinical drama. Field treated a case of carcinoma of the cervix associated with pregnancy with immense doses of radium. The woman died within a year from the effects of metastatic carcinoma of the liver.

Weibel advises against every kind of actinotherapy on account of its destructive influence on the child. Bottaro and de Bengoa have coined the new word "Rochar" from the initials of the procedures to be successively employed in the treatment of carcinoma of the cervix in pregnancy. Radium, observation, cesarean, hysterectomy, adnexectomy and radiation is the sequence of measures thus graphically recommended.

It is hardly worth while to consider at any length the merits of the various refinements of technic suggested from time to time for the execution of the several radical operations. They differ in no essential particulars from those employed in nonpregnant patients.

It is, of course, strictly in accordance with modern tendencies to avoid shock and hemorrhage by every feasible means. Mason and Konrad have suggested that this may be accomplished by paravertebral anesthesia and a two-stage operation. "The panhysterectomy

whether by the abdominal or vaginal route" is postponed until the patient shall have recovered from the shock of the primary cesarean section.

But an early recognition of the tumor is the factor which determines the clinical fate of a pregnant woman who has a cancer of the cervix.

It has already been emphasized that these tumors exhibit various degrees of malignancy. And it is safe to say that a majority of the cured cases have been of the squamous-cell type. This was the diagnosis in our case made by Prof. Ed. L. Miloslavich of Milwaukee. It is my impression that in this instance the pregnancy did not materially influence the growth of the tumor. That it did not accelerate its extension is conclusively evident from the fact that it was readily operable after the symptoms had continued for over a year.

CONCLUSIONS

1. A considerable proportion of the public is still in need of instruction on the cancer question.

2. Carcinoma of the cervix associated with pregnancy is a rare combination.

3. Trauma incident to labor or abortion is an important etiologic factor.

4. Women who have borne many children in rapid succession are most likely to develop this condition.

5. Accordingly, for a year subsequent to pregnancy multipara should be watched with especial care for the early evidences of malignancy.

6. So long as it remains local, carcinoma of the cervix does not cause sterility.

7. In rare instances carcinoma of the cervix may coexist with pregnancy for an extended period without exhibiting any clinical manifestations.

8. As a rule there exists a certain "parallelism" between the stage of pregnancy and the degree of advancement of the malignant growth.

9. In the majority of cases the carcinoma antedates the pregnancy. But it is not always an easy matter to determine this question.

10. That there is a comparatively benign and a more malignant type of carcinoma has often been observed. And it is more than likely that statistics of extraordinary results, in a small series of cases, depend largely on this circumstance.

11. The results of animal experimentation with cancer cannot be applied, without modification, to human individuals.

12. It has not been proved that the incidence of pregnancy invariably causes the tumor to grow with increased rapidity.

13. Exeision of a piece of the cervix will injure neither mother nor fetus.

14. Carcinoma of the cervix complicated by pregnancy must be differentiated from placenta previa, varicose veins, accidental hemorrhage, and benign tumors.

15. "Therapeutic abortion is strictly contraindicated in these cases." (Edgar.)

16. Just how much consideration is to be given the unborn child will depend on the ethical sensibilities of the patient and her physician.

THE CLINICAL SIGNIFICANCE OF CHEMICAL AND SERUM ANALYSES OF THE BLOOD OF UTERINE CANCER CARRIERS SUBJECTED TO MEASURED RADIATION DOSES*

BY HENRY SCHMITZ, M.D., CHICAGO, ILLINOIS

ROENTGEN and radium ray sickness has interested clinicians for some time. Walsh,¹ in 1897, was probably the first to recognize and describe this reaction. Pfahler² attributed the symptoms to poor ventilation of the roentgen ray room, the patient inhaling some gases present in the air that were produced by the action of the high-tension current. Wilbert³ expressed this same theory in a different manner as the cause of the symptoms. Another theory is that of a toxin produced in the blood by the roentgen rays and that this toxin is responsible for the blood changes causing roentgen ray sickness. (Linser and Siek,⁴ Engel,⁵ Joltrain and Bernard.⁶)

Linser and Helber,⁷ Warthin,⁸ Rosenstern⁹ and others have explained the symptoms upon a basis of a nephritis caused by the roentgen rays. Krause and Ziegler,¹⁰ Buschke and Schmidt,¹¹ Hall and Whipple¹² could not find evidence of nephritis following roentgen ray treatment.

Lange¹³ attributes the symptoms to the acidosis that develops as a result of cellular activity. Hirseh and Petersen¹⁴ find a disturbance of the acid-base equilibrium, and sometimes a slight lowering of the alkaline reserve, manifested immediately after treatment of patients with roentgen rays. Golden¹⁵ observed no diminution of the alkali reserve after treatment with roentgen rays.

Autolytic ferments present in tissues under normal conditions have been thought by some observers to be accelerated in their action as a

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

result of radiation (Baerman and Linser,¹⁶ Rosenstern,¹⁷ Edsall¹⁸). Heile¹⁹ has shown that the spleen removed from dogs treated with radiation autolyses more rapidly than the control spleen from unrated animals. Neuberg²⁰ found the same to be true using cancer tissue. Richards²¹ experimented with ferments *in vitro* and found the roentgen rays in small doses accelerated and in larger doses inhibited action.

Some have thought the symptoms were brought about by the destruction of white blood cells with the liberation of the enzymes of these cells.

The part played by ferments in the roentgen ray sickness must, at the present time, remain an open question. There is not sufficient experimental evidence to warrant a conclusion to be drawn at this time.

As mentioned above, the well known decrease in the number of white blood cells after treatment with roentgen rays has been connected in some way with roentgen ray sickness by several observers. Giraud, Giraud and Parès²² have recently shown that the leucopenia does not follow the radiation of an organ (spleen) that has been clamped off from the circulation, but leucopenia occurs as soon as the clamps are removed and the blood of the treated organ is allowed to flow into the systemic circulation. The changes in the white blood cells following radiation would take us too far afield from our present paper to warrant further discussion at this time. But it might be added that the sensitiveness of the white blood cells, lymphocytes and leucocytes, is not limited to roentgen rays. These are probably the most responsive cells in the body as Leo Loeb²³ has recently stated: "They are the finest reagents for the discovery of what we have called syngenesio- and homotoxins."

Hall and Whipple²⁴ observed in dogs after massive doses of roentgen rays that the nonprotein nitrogen of the blood was markedly increased a short time before death, the urinary nitrogen increased following the exposure to the roentgen rays and remained high until the death of the animals. These authors conclude that the roentgen ray intoxication or general constitutional reaction is a good example of a "nonspecific" intoxication.

The chemical constituents of the blood of cancer patients have received considerable attention. The first work was done in an effort to find some variations in these constituents that would help in understanding the neoplastic process involved or as an aid in its diagnosis. The results obtained from this line of work have been negative. (Theis^{24, 25}.)

There has been little attention paid to the blood from a chemical standpoint during the treatment of neoplastic growths with roentgen rays and radium. Whipple and his associates^{26, 27} found an increase in the nonprotein and urea nitrogen of the blood in dogs exposed to massive doses of roentgen rays. These workers observed focal necrosis

in the lining of the small bowel and suggest that this may cause the general intoxication with the accompanying vomiting and diarrhea.

Hirseh and Petersen²⁸ could not demonstrate a striking or consistent alteration in the urea nitrogen, total nonprotein nitrogen, uric acid or creatinin in blood of carcinoma patients treated with roentgen rays.

The first effect produced upon the neoplastic growth after radiation is of a traumatic nature. The hyperemia that is first noted is quickly followed by an exudation of lymphocytes and leucocytes, and accompanying this one sees a swelling of the epithelial element in the radiated tumor.

There is always some necrosis in all malignant growths; there must be a process of autolysis going on all the time in such areas. Petry²⁹ was the first to call attention to this fact. This author found that the nitrogen not coagulated by heat is increased in breast carcinomata, while in the normal breast practically all of the nitrogen is coagulable. This has been substantiated by several workers.

If the proper amount of radiation energy is applied to a deep-seated neoplastic growth, the subsequent hyperemia and edema should lead to an increased absorption of the autolytic products. Noncoagulable proteins will form a part of the material in such an area. The absorption of these, with protein splitproducts of a higher order, within a relatively short period of time due to the hyperemia and increased permeability of the capillary plexus should lead to symptoms of intoxication in the patient.

If a larger dose of radiation is applied, leading to hemorrhage and thrombosis immediately following its application, we would expect little absorption from the radiated area as compared with one in which the dose was not great enough to damage the blood vessels in the area. Such an injury caused by overradiation should produce shock symptoms in the patient, not accompanied by evidence of absorption of the autolytic products of the neoplastic mass.

Freund and Kaminer^{30, 31} found that tumor cells, separated from the connective tissue and blood, when suspended in 0.6 per cent sodium chloride solution, were destroyed by the serum of noneancerous subjects; but, on the other hand, they found serum of cancerous patients did not cause a destruction of the tumor cells in the suspension. They attributed this to some lytic property present in normal serum that was capable of destroying the cancer cells.

To review the whole field of the Freund-Kaminer reaction would take too much time and space. The results of various observers have not been constant. There are many uncontrollable factors involved in the reaction. I agree with most workers that this reaction can hardly be used for diagnostic purposes. My purpose in using the Freund-Kaminer reaction was to see the effect that would be exerted by the radiation

upon the serum of cancerous patients taken at various times following the initial therapeutic dose.

I wish only to mention the results obtained by other workers using the Freund-Kaminer reaction in malignant growths treated in various ways. Freund and Kaminer, using their original technic showed that the serum from patients who had the carcinoma removed by radical operative procedures, returned to the usual normal serum in respect to their lytic power of carcinoma cells. Koritschoner and Morgenstern,³² by using the refractometric method, showed that in one case of carcinoma of the rectum the differences in the reading before and after digestion with the carcinoma cells and the patient's serum was -10; one month after the tumor was surgically removed, the difference was +20, or comparable to a normal serum. These authors also show two cases, five and four years respectively, after surgical removal of malignant growth, in which the sera reacted like nonmalignant or normal sera.

I have observed for many years a large number of patients with pelvic carcinomata subjected to radiation therapy. Some of these evidenced severe reactions, others showed only mild or no reactions at all. Again I lost seven patients who died from a severe intoxication. Clinically I found that patients having a clearly inoperable carcinoma with large ulcerating and infiltrating and necrotizing growths, usually showed a marked reaction, while the patients with borderline growths evidenced usually a mild or no reaction at all; while the deaths occurred in patients with frozen pelves and low vitality. The condition of the blood and leucopenia apparently did not explain these discrepancies in reactions. I therefore concluded to undertake a series of chemical analyses of the blood and blood serum to determine the effect of radiations on the patients.

The technic and dosage of radiation therapy have been described in other communications, especially in an article entitled "Technique and Statistics in the Treatment of Carcinoma of the Uterus and Contiguous Organs with the Combined Use of Radium and X-Rays," published in the *American Journal of Roentgenology* in October, 1922. Those interested are referred to this monograph to obtain the exact measuring of a 120, 150 or 175 per cent E.S.D. of combined radium and x-ray dosage.

To draw practical and clinical conclusions from these investigations I deemed it advisable to include in the list of cases investigated carcinomata of other regions of the body, and also benign uterine diseases subjected to radiation treatment.

TECHNIC

The patients entered the hospital at least twenty-four hours before the beginning of treatment. In most instances, they were in the hospital for a longer period of time before treatment was started. The

blood was taken from the arm vein before breakfast on the day the first radiation treatment was administered, the patient having been on a fluid diet for twenty-four hours. The next morning before breakfast another blood specimen was taken, the patient remaining on a fluid diet. The third specimen was taken one week after treatment; the fourth specimen six weeks after treatment. In many patients living at a distance from Chicago, it was impossible to obtain the fourth specimen as patients were dismissed from the hospital before this time after treatment. All blood specimens were taken before breakfast, i. e., during a postabsorptive period.

The blood chemical methods followed were those of Folin and Wu. The Freund-Kaminer³⁴ reaction was carried out according to the technique of those authors, using the refractometer suggested by Koritschoner.³³ The cancer tissue extract was obtained from Dr. G. Kaminer.

Table I contains in brief tabulated form the record of thirty-five cases studied by us during the past few months. The blood chemical findings: (1) before treatment; (2) twelve to eighteen hours after treatment; (3) one week after treatment; and (4) six weeks after treatment. There is, in addition to diagnosis, a short note of the outstanding features of the condition with the dose of radiation energy used.

Cases of carcinoma of the cervix of the uterus showing intoxication following radiation treatment. Cases I to VII inclusive.

Reference to Table I will show that all seven cases included in Table II are advanced carcinomata of the cervix; parametrium and vagina were invaded in most instances. Necrosis was present in all cases, usually most marked in the cervix, surrounded by the malignant and infiltrating growth. Intoxication followed the radium treatment.

The average nonprotein, urea and rest nitrogen before treatment are within the normal amounts found in resting individuals on a fluid diet. Even the increase after radiation is not high for blood under pathologic conditions, but is 40 to 55 per cent higher than before treatment.

Cases of carcinoma of organs other than the uterus, with one case of myoma uteri, showing intoxication following radiation treatment. Cases VIII to XIV inclusive.

Upon consulting Table I, it will be seen that the cases referred to in Table III can hardly be considered together from a morphologic or pathologic standpoint. Two were mammary cancer, one bladder, one lingual, one lip cancer, one inguinal lymph gland, involvement by metastasis from serotum cancer, and one was myoma of the uterus. There was one feature characterizing all of these growths, namely, degenerative processes. Intoxication followed the radiation treatment.

When Table III is examined, it will be seen that the amounts of the various nitrogen fractions are higher before treatment than are those cases considered in Table II; in fact, the average normals in Table III are about the same as the average after treatment figures in Table II.

TABLE I

PATIENT	DIAGNOSIS		BLOOD CHEMICAL ANALYSIS						REACTION FROM RADIATION	REMARKS
			N. P. N.	UREA	CREATININ	URIC ACID	REST N.	SUGAR		
Mrs. S. I	Carcinoma cervicis uteri	I	21.1	11.0	2.2	2.2	5.7	0.11	Severe	Cervix filled with soft tissue. Paracervical infiltration. 175% E.S.D.
		II	38.8	18.6	2.1	3.4	14.7	0.08		
		III	29.0	15.0	2.5	3.0	8.5	0.14		
		IV	26.1	13.8	1.8	2.8	7.7	0.07		
Mrs. C. II	Carcinoma cervicis uteri	I	34.7	17.1	1.6	3.0	13.0	0.06	Severe	Cervix filled with necrotic mass. Parainfiltration. 100% radium dose.
		II	38.2	19.0	1.7	3.1	14.4	0.09		
		III	22.2	11.0	1.2	2.9	7.1	0.06		
		IV	22.9	9.9	1.5	2.7	8.8	0.07		
Mrs. N. III	Carcinoma cervicis uteri Diabetes mellitus	I	31.2	16.0	1.6	2.9	10.7	0.13	Severe	100% radium dose.
		II	38.4	19.0	1.6	3.0	14.8	0.14		
		III	28.4	15.6	1.5	2.8	8.5	0.13		
		IV	23.1	12.7	1.2	3.0	6.2	0.13		
Mrs. C. IV	Carcinoma cervicis uteri recurrens	I	30.7	15.1	1.5	1.4	12.7	0.08	Severe	Vagina and parametrium invaded. 150% E.S.D.
		II	40.2	20.6	1.9	2.1	15.6	0.09		
		III	27.0	14.8	1.5	1.8	8.9	0.07		
		IV	23.8	11.7	1.5	1.8	8.9	0.08		
Mrs. T. V	Carcinoma cervicis uteri	I	25.7	14.0	1.2	3.0	7.5	0.14	Severe	Infiltration of whole cervix. No parametrial involvement. 120% E.S.D.
		II	40.9	21.2	1.4	3.3	15.0	0.12		
		III	32.0	17.2	1.3	2.8	10.7	0.08		
Mrs. H. VI	Carcinoma cervicis uteri	I	21.0	12.0	1.2	4.2	3.6	0.12	Severe	Cervix filled with necrotic mass. Paracervical invasion. 175% E.S.D.
		II	33.8	18.0	1.5	4.9	9.4	0.14		
		III	31.3	18.0	1.4	3.6	8.3	0.09		
Mrs. P. VII	Carcinoma cervicis uteri	I	22.8	10.0	1.0	3.5	8.8	0.09	Severe	Vaginal wall and parametrium involved. 150% E.S.D.
		II	35.3	17.6	1.1	4.1	12.5	0.09		
		III	25.8	12.4	1.0	3.0	11.4	0.09		
		IV	26.1	14.0	1.1	3.0	8.8	0.10		
Mrs. W. VIII	Carcinoma mammar recurrent	I	32.6	17.4	2.1	3.4	9.7	0.12	Severe	Lung involvement. 150% E.S.D.
		II	43.3	21.2	2.4	4.2	15.5	0.14		
		III	35.6	18.0	2.3	4.1	11.2	0.13		
Mr. B. IX	Carcinoma inguinal glands	I	35.2	18.0	2.5	3.0	11.7	0.06	Severe	Recurrent from carcinoma of scrotum. Sloughing and necrotic mass. 175% E.S.D.
		II	42.3	20.0	2.6	2.9	16.8	0.06		
		III	35.8	18.6	2.4	3.1	11.7	0.06		
Mr. F. X	Carcinoma tongue	I	42.3	20.7	1.7	4.4	15.5	0.10	Severe	Large ulcerating and necrotic mass on left side, involving tonsil and pharynx. 150% E.S.D.
		II	48.1	23.8	1.6	4.5	18.2	0.11		
		III	38.4	18.4	1.2	4.0	14.8	0.10		
		IV	31.6	16.0	1.5	4.4	9.7	0.10		
Mrs. C. XI	Carcinoma bladder	I	37.1	19.3	2.5	3.0	12.3	0.12	Severe	100% radium dose. 120% x-ray dose.
		II	51.6	25.4	2.7	4.5	19.0	0.16		
		III	43.8	21.0	2.4	4.1	16.3	0.14		
Mrs. S. XII	Carcinoma mammar	I	32.6	20.4	2.3	3.5	6.4	0.11	Severe	Infiltrating growth involving both breasts. 175% E.S.D.
		II	68.4	39.6	3.3	3.8	21.7	0.12		
		III	44.0	26.2	2.9	3.5	11.4	0.11		

TABLE I—Cont'd

PATIENT	DIAGNOSIS		BLOOD CHEMICAL ANALYSIS						REACTION FROM RADIATION	REMARKS
			N. P. N.	UREA	CREATININ	UHC ACID	REST N.	SUGAR		
Mrs. V. XIII	Myoma uteri	I	36.3	19.1	2.2	3.0	12.0	0.14	Severe	Necrotic areas in myoma. 100% radium dose.
		II	52.1	27.0	1.8	3.2	22.1	0.15		
		III	39.9	21.0	1.9	3.0	14.0	0.13		
Mr. R. XIV	Epithelioma lower lip	I	36.3	19.4	3.6	4.1	9.2	0.11	Severe	Ulceration and involvement of cervical lymph nodes.
		II	44.0	20.6	3.4	3.9	16.1	0.13		
		III	38.2	18.2	3.0	3.7	13.3	0.10		
		IV	30.6	16.1	3.1	4.0	7.4	0.10		
Mrs. C. XV	Carcinoma mammae	I	28.8	14.7	1.3	3.0	9.8	0.09	None	Superficial ulceration. No involvement of axilla, etc. 150% E.S.D.
		II	26.3	13.7	1.4	3.1	8.1	0.11		
		III	24.8	12.5	1.3	3.2	7.8	0.10		
Mrs. P. XVI	Carcinoma mammae	I	42.9	22.1	2.1	3.2	15.5	0.11	None	Superficial ulceration. No involvement of axilla, etc. 175% E.S.D.
		II	47.3	24.2	2.3	4.0	16.8	0.12		
		III	29.1	15.0	2.1	3.8	8.2	0.12		
Mrs. R. XVII	Carcinoma cervicis uteri	I	20.6	9.8	1.6	1.7	7.5	0.09	Slight	Cervix amputated. Uterus and adnexa normal. 130% E.S.D.
		II	25.1	12.1	1.5	1.6	9.4	0.10		
		III	24.7	11.3	1.8	1.8	9.8	0.09		
Mrs. B. XVIII	Chorio-epithelioma	I	32.9	17.0	1.5	2.8	11.6	0.11	None	Removed with curette. 175% E.S.D.
		II	40.5	22.4	1.4	3.7	13.0	0.10		
		III	37.3	19.3	1.6	3.8	12.6	0.09		
Mrs. Z. XIX	Sarcoma of Corpus uteri	I	25.4	12.0	2.0	3.9	7.5	0.10	None	150% E.S.D.
		II	24.2	12.6	1.5	2.4	7.7	0.11		
		III	23.0	11.8	1.6	3.3	7.3	0.10		
Mr. B. XX	Carcinoma of tonsil	I	31.7	17.4	1.5	3.0	13.1	0.09	None	150% E.S.D.
		II	30.0	16.2	1.3	3.1	9.4	0.10		
		III	26.0	16.6	1.5	2.9	5.0	0.09		
Mr. F. XXI	Carcinoma right antrum	I	25.9	13.0	1.8	2.7	8.4	0.08	None	Curetting. 150% E.S.D.
		II	28.0	14.0	2.0	3.0	9.0	0.10		
		III	30.4	16.8	2.0	2.9	8.7	0.08		
Mr. P. XXII	Carcinoma lower jaw	I	30.3	12.8	1.5	3.8	12.2	0.12	None	Solid hard tumor mass. 150% E.S.D.
		II	32.0	16.4	1.4	4.0	10.2	0.14		
		III	37.0	18.1	2.2	3.6	13.1	0.14		
Mrs. M. XXIII	Hemorrhagic metropathy	I	25.6	14.0	1.5	2.4	7.7	0.10	None	100% E.S.D.
		II	19.1	10.0	1.6	3.0	4.5	0.11		
		III	25.9	13.6	1.7	2.9	7.7	0.10		
Mrs. M. XXIV	Hemorrhagic metropathy	I	28.0	13.5	1.9	1.9	10.7	0.09	None	75% E.S.D. radium intrauterine. 100% E.S.D. x-ray.
		II	32.0	17.0	1.6	2.4	11.0	0.10		
		III	23.7	12.0	1.4	2.0	8.3	0.08		
Mrs. P. XXV	Hemorrhagic metropathy	I	35.2	17.0	1.8	2.0	14.4	0.06		100% E.S.D.
		II	36.2	18.0	2.0	2.2	14.0	0.06		
		III	32.1	16.0	1.8	2.1	12.2	0.05		
Mrs. M. XXVI	Carcinoma cervicis uteri	I	27.6	12.1	2.6	2.1	10.8	0.09	Slight	3 months previous had 100% E.S.D. 175% E.S.D. at this time.
		II	26.1	14.2	3.0	2.4	8.4	0.10		
		III	26.0	11.0	2.8	2.2	10.0	0.10		

TABLE I—Cont'd

PATIENT	DIAGNOSIS		BLOOD CHEMICAL ANALYSIS						REACTION FROM RADIATION	REMARKS
			N. P. N.	UREA	CREATININ	URIC ACID	REST N.	SUGAR		
Mrs. K. XXVII	Carcinoma cervicis uteri	I	23.5	13.6	2.1	3.9	3.9	0.10	None	4 months previously had 175% E.S.D. Large infiltrating mass in left parametrium. 175% E.S.D.
		II	24.4	15.1	2.0	4.0	3.3	0.10		
		III	22.0	12.0	2.2	3.7	4.1	0.09		
Mrs. B. XXVIII	Carcinoma cervicis uteri	I	31.5	18.2	2.1	1.9	9.7	0.10	Slight	Extensive recurrence with necrosis. Previously treated with x-ray.
		II	33.3	16.1	2.0	2.1	13.1	0.11		
		III	30.1	17.3	2.0	2.0	8.8	0.09		
Mrs. D. XXIX	Metastatic tumor anterior abdominal wall	I	29.9	16.4	2.6	3.1	7.8	0.09	None	Following oophorectomy for cystoma. Treated 7 months previously with x-ray.
		II	27.5	12.0	2.5	3.0	10.0	0.10		
		III								
		IV	23.4 28.0	13.6 14.7	2.4 2.5	2.8 3.0	4.6 7.8	0.11 0.09		
Mrs. F. XXX	Carcinoma cervicis uteri	I	30.7	15.6	2.4	3.1	9.6	0.10	None	Ulceration and necrosis marked. Radiated 5 months previously.
		II	29.6	14.4	3.0	3.4	8.8	0.10		
		III	28.7	14.0	2.8	3.2	8.7	0.09		
Mr. C. XXXI	Carcinoma right inferior maxilla	I	25.4	12.2	3.8	4.0	5.4	0.12	None	Necrosis and cervical glands involved. Terminal. 150% radium dose.
		II	24.4	11.8	3.9	4.1	4.6	0.13		
		III	26.0	13.7	3.5	3.3	5.5	0.12		
		IV	20.0	9.2	2.3	3.5	5.0	0.09		
Mrs. N. XXXII	Carcinoma cervicis uteri recurrens	I	25.4	12.1	2.5	2.1	8.7	0.07	None	Pelvis frozen. Vaginal vault necrotic. Terminal. 175% E.S.D.
		II	30.2	16.0	2.6	2.0	9.6	0.09		
		III	29.5	14.7	2.3	2.1	10.4	0.08		
Mr. F. XXXIII	Carcinoma cervical glands	I	36.1	20.8	2.2	3.0	10.1	0.09	None	Large indurated area. Terminal.
		II	27.4	11.9	2.0	3.3	10.2	0.08		
		III	29.5	15.4	1.8	2.9	9.4	0.08		
Mrs. R. XXXIV	Carcinoma mammar recurrens	I	20.6	9.6	3.6	4.0	2.8	0.10	None	Radical amputation 6 months previous. Scar and axilla indurated. 150% E.S.D.
		II	48.3	24.0	4.2	4.6	15.5	0.11		
		III	31.7	15.3	3.9	3.8	8.7	0.09		
		IV	37.9	14.0	2.3	4.0	7.9	0.11		
Mr. D. XXXV	Metastatic carcinoma kidney	I	24.6	16.3	2.6	3.6	2.1	0.10	Slight	130% x-ray dose.
		II	28.9	19.3	2.1	4.2	3.3	0.09		
		III	27.4	17.2	2.4	4.0	3.8	0.10		

The amounts of nitrogen in the blood after treatment in the group included in Table III are too high to be considered normal. The increase in the nonprotein and urea nitrogen was 33 and 32 per cent, but the rest nitrogen fraction increased 96 per cent.

The high control nonprotein fractions are suggestive of kidney impairment in this series. The increase in the nonprotein and urea nitrogen in the blood after treatment is not so great as the increase in the rest nitrogen fraction; the latter increased almost 100 per cent as compared with 33 per cent of the former two respectively. This is prob-

TABLE II

	BEFORE TREATMENT		12 TO 18 HOURS AFTER TREATMENT		
	VARIATIONS	AVERAGE	VARIATIONS	AVERAGE	INCREASE
Nonprotein nitrogen	21.0-34.7*	26.7	33.8-40.2	37.9	42%
Urea nitrogen	10.0-17.1	13.6	17.6-21.2	19.1	40%
Rest nitrogen	3.6-13.0	8.8	9.4-15.6	13.7	55%

*All figures represent milligrams per 100 c.c. whole blood.

TABLE III

	BEFORE TREATMENT		12 TO 18 HOURS AFTER TREATMENT		
	VARIATIONS	AVERAGE	VARIATIONS	AVERAGE	INCREASE
Nonprotein nitrogen	32.6-42.3*	36.0	42.3-68.4	47.1	33%
Urea nitrogen	17.4-20.4	19.2	20 -39.6	25.4	32%
Rest nitrogen	6.4-15.5	9.5	15.5-22.1	18.5	96%

*All figures represent milligrams per 100 c.c. whole blood.

ably due to the increased absorption of autolytic products present in and around the tumor areas exposed to radiation.

The severe cases of "roentgen ray sickness" were encountered in this group of cases of early neoplastic growths of various organs not showing intoxication following radiation treatment.

Cases of early neoplastic growths of various organs not showing intoxication following radiation treatment. Cases XV to XXII inclusive.

The cases considered in Table IV form a varied pathologic group. They were all early neoplastic growths, characterized by little or no evidence of degenerative changes. No intoxication was noticed after radiation. The nitrogen fractions, as shown in Table IV, before and after treatment do not show a marked change, the fluctuations are within normal daily variations, the changes varying from +9 to -14 per cent.

TABLE IV

	BEFORE TREATMENT		12 TO 18 HOURS AFTER TREATMENT		
	VARIATIONS	AVERAGE	VARIATIONS	AVERAGE	INCREASE (+) OR DECREASE (-)
Nonprotein nitrogen	20.6-42.9	29.8	24.2-47.3	31.6	+6%
Urea nitrogen	9.8-22.1	14.8	12.6-24.2	16.3	+9%
Rest nitrogen	7.5-15.5	10.7	7.7-16.8	9.2	-14%

Cases of hemorrhagic metropathy; no intoxication following radiation. Cases XXIII to XXV inclusive.

There was little variation in the blood nitrogen fractions before and after treatment in these cases. (Table I.) It should also be noted that the dosage was small as compared to that used for therapeutic doses in malignancy. In these cases the necrotic or autolyzing tissue was negligible in amount and the dosage was in keeping with the minor pathologic changes.

The results of the blood chemical findings in these and subsequent cases does not warrant special tabulation; such tables would not differ materially from the averages shown in Table IV.

Recurrent cases of malignancy following previous treatment by radiation. There was no intoxication in these cases after the last treatment. Cases XXVI to XXX inclusive.

The nitrogen fractions do not show much variations before and after treatment in these cases. There was no intoxication following our treatment.

Very advanced cases of malignancy showing no evidence of intoxication after radiation. Cases XXXI to XXXIII inclusive.

These were all hopeless cases. The absence on any evidence of a reaction although autolysis and other degenerative changes were present, we attribute to lack of reactive power on the part of the patient. All of these cases died within a short period of time.

CASE XXIV.—Carcinoma of right breast; radical amputation on September 5, 1922. On December 28, 1922, the area of operation, scar and the axilla were found indurated. Several palpable nodules were in the chest wall. It was radiated with 175 per cent E.S.D. There was a marked rise in the various nitrogen fractions of the blood after treatment. There was no intoxication accompanying this rise. In this respect this case is an exception to the previously mentioned cases. We cannot explain this lack of reaction accompanied by a marked elevation of the nonprotein nitrogen fractions at this time. We cite this case as an exception to those recorded above.

CASE XXXV.—Metastatic carcinoma of the left kidney. A large massive tumor was felt in the upper left abdomen surrounded by indurated area. Two operations had been previously performed for the removal of the tumor in this region, one five years and one three months before applying for treatment. A 130 per cent E.S.D. of x-rays was given. There was no marked intoxication and no change in the nonprotein nitrogen constituents comparable to other cases of similar nature. I cite this case as another exception to those reported in this paper.

I have omitted all cases of malignancy treated by radiation that show abnormally high nonprotein nitrogen of the blood. These cases have severe kidney involvement of one kind or another and cannot be considered in this group. I am engaged in the study of this type of cases at the present time.

The results obtained by radiation in experimental laboratory animals is hardly comparable with those obtained by radiation in cancer patients. The size of the field of radiation, the anatomic location, the histologic structure, the chemical composition and the vascularity of the tumor mass all must be considered, in conjunction with the proper dosage of radiation energy, before we can interpret the immediate and latent action arising in the patient.

The patients showing a severe reaction following the treatment with roentgen rays and radium have an increase in the nonprotein nitrogen of the blood. The urea and the rest nitrogen fractions show the greatest

increase in amounts. I think this is due to rapid absorption of the autolytic products from the tumor area, due to the hyperemia and edema that follow immediately after radiation.

The increase in uric acid is more marked, as a rule, than the creatinin; this, I think, comes from the same source.

The patients showing no evidence of intoxication did not have a noticeable increase in the nonprotein nitrogen of the blood.

"Radiation sickness" occurs in those patients who have areas of autolyzed or necrotic tissue associated with the neoplastic tumors. This reaction comes on relatively soon after radiation. The microscopic picture of the tumor at the time "radiation sickness" occurs in the patient shows an inflammatory reaction primarily. The hyperemia of the blood vessels with edema of the adjacent tissues is a characteristic picture. The degenerative changes in the neoplastic cellular tissue is not noticeable at this time, but occurs five to seven days after radiation.

The following examples, cases taken from Table I, can be cited and used to make clearer the above statement.

Mrs. C.—II. Necrotic mass in the cervical region; parametrium infiltrated. Received 100 per cent E.S.D. Severe intoxication.

Mrs. T. V.—Infiltration and ulceration of the cervix; no parametrium involvement. Received 120 per cent E.S.D. Severe intoxication.

Mrs. B.—XVIII. Chorioepithelioma, removed with curette. Received 175 per cent E.S.D. No intoxication.

Mrs. R.—XVII. Early carcinoma of the cervix; uterus and adnexa normal. Cervix amputated fourteen days before radiation began. Received 130 per cent E.S.D. No intoxication.

A careful study of Table I reveals many such instances. In these four cases just mentioned, the first two received less radiation than the third case, although the former two had "radiation sickness," the latter case showed little or no evidence of intoxication. The first and fourth cases just cited were both cervical carcinoma, the one with the autolyzing masses of tissue had severe "radiation sickness;" the latter one with no evidence of any degenerative process in pelvis, did not show evidence of intoxication.

Necrotic or autolyzing areas of tissue, particularly when parenchymal elements predominate, are always acid in reaction. The increased hydrogen-ion concentration of the part, due to the interaction of many factors, such as decreased oxygen supply, increased carbon dioxide tension, organic acid radicals, accumulates as a result of excessive catabolic activity in such an environment and probably plays some minor rôle in the "radiation sickness" after absorption of these acid products. A slight shifting of acid base equilibrium in the blood after radiation of cancer patients would be expected; that this should be of short duration and quickly corrected by a mobilization of alkali reserve would also be expected under physiologic conditions. An overcorrection, by the mobil-

ization of more alkali than necessary to just balance the acid bodies absorbed, would also be expected to take place under physiologic conditions. This is exactly what Hirsch and Petersen¹⁴ found to be true by careful experiments, using the gas chain method to obtain the hydrogen concentration values of the blood of cancer patients before and after radiation.

The conclusions and clinical significance to be drawn from these observations are: (1) Patients with carcinomata free from necrosis and of limited extent called localized and borderline cases may be given the total radiation dose within the shortest time possible. (2) Patients with extensive and necrotizing carcinomata should be treated with fractional doses at stated intervals. We may apply at the first sitting a dose which will arrest the bleeding and discharge, and temporarily stem the further growth of the carcinoma. As soon as the patient has passed the period of the radiation intoxication the rest of the dose may be applied. We thus ameliorate the distressing symptoms and stormy course of the radiation intoxication. (3) Patients with extensive carcinoma filling the small pelvis, having large necrotizing masses and causing advanced cachexia should not be subjected to radiation treatment. They cannot be benefited in the slightest degree and we only hasten the inevitable fatal end. (4) Recurrences occurring after the application of a correctly gauged radiation dose should not be retreated. Such patients have become radiation fast. A useless repetition of the treatment must effect a distrust in an otherwise valuable treatment.

TABLE V

		SERA BEFORE ADDING TO TISSUE READING N.D.		SERA 45 MINUTES AFTER ADDING TO TISSUE READING N.D.		SERA 24 HOURS AFTER ADDING TO TISSUE READING N.D.		DIFFERENCE
Average of 12 normal sera		61.5	1.35076	61.5	1.35076	61.8	1.35088	12
Mrs. A. Carcinoma of cervix uteri	I	56.4	1.34888	56.4	1.34888	56.4	1.348888	0
	II	55.8	1.34865	55.8	1.34865	55.8	1.34865	0
	III	55.15	1.34842	55.15	1.34842	55.1	1.34840	-2
	IV	56.2	1.34880	56.2	1.34880	56.4	1.34880	+8
Mrs. T. Carcinoma of cervix uteri	I	58.0	1.34947	58.0	1.34947	58.1	1.34950	+3
	II	56.2	1.34880	56.2	1.34880	56.5	1.34891	+11
	III	57.1	1.34914	57.1	1.34914	57.6	1.34932	+18
	IV							
Mrs. B. Carcinoma of right breast	I	63.4	1.35147	63.4	1.35147	63.4	1.35147	0
	II							
	III	62.0	1.35095	62.0	1.35095	59.5	1.35103	+8
	IV							
Mr. B. Carcinoma of left ear	II	55.0	1.34836	55.0	1.34836	55.0	1.34836	0
	III	54.6	1.34820	54.6	1.34820	54.8	1.34828	+8
	IV							
Mrs. H. Carcinoma of cervix uteri	I	60.4	1.35036	60.4	1.35036	60.4	1.35032	-4
	II	59.3	1.34995	59.3	1.34995	59.7	1.35010	+15
	III	59.5	1.35002	59.5	1.35002	59.8	1.35021	+22
	IV							

Table V gives in condensed form the results obtained by using the Freund-Kaminer reaction on the serum of carcinoma patients treated with radium and roentgen rays. The Roman figures on the margin designate the time in relation to the treatment that the serum was obtained: (I—before treatment; II—twenty-four hours after treatment; III—seven days after treatment; IV—four weeks after treatment.)

The technical difficulties encountered in the refractometric Freund-Kaminer reaction are so great that the use of this reaction is limited in its value. Outside of the usual precautions for such refractometric work, the repeated handling of the sera under strictly sterile conditions is very difficult. All experiments were run in triplicate. All readings made upon sera that showed cloudiness or bacterial growth upon subculture were eliminated.

An examination of the cases reported upon will show a gradual change toward normal serum reaction after treatment with radium and roentgen rays. This is the same as has been observed by other authors after surgical removal of malignant growths.

This report is a preliminary publication upon this subject. The chemical study of the blood is now being continued, and will be extended to a careful metabolic study of the patients treated with radiation. The Freund-Kaminer reaction is also being extended to include the patients studied from the above mentioned standpoint.

SUMMARY

1. "Radiation sickness" is caused by the absorption of autolytic products from the degenerative areas of the tumor mass. This intoxication is an example of a "nonspecific" reaction.

2. The sera of patients with carcinoma become carcinomalytic after treatment with radium and roentgen rays, as evidenced by the Freund-Kaminer reaction.

3. The results of the chemical and serum examinations of the blood of carcinoma patients would indicate that patients with extensive and necrotic cancer tumors should be subjected to radiation therapy with a great deal of caution, using preferably a fractional interval method to prevent severe radiation intoxications. Patients with advanced carcinomata should not be subjected to radiation therapy.

BIBLIOGRAPHY

- (1) *Walsh*: Brit. Med. Jour., 1897, ii, 272. (2) *Pfahler*: Am. Jour. Roent., 1916, iii, 310. (3) *Wilbert*: Philadelphia Med. Jour., 1899, iii, 1014. (4) *Linser and Sick*: Deutsch. Arch. f. klin. Med., 1906-07, p. 413. (5) *Engel*: Deutsch. med. Wchnschr., 1907, xxxiii, 22. (6) *Joltrain and Bernard*: Compt. rend. Soc. de biol., 1922, p. 784. (7) *Linser and Heiber*: Deutsch. Arch. f. klin. Med., 1905, p. 479. (8) *Warthin*: Am. Jour. Med. Sc., 1907, cxxxiii, 736. (9) *Rosenstern*: München. med. Wchnschr., 1906, p. 1063. (10) *Krause and Ziegler*: Fortschr. a. d. Geb. der Roentgenstrahlen, 1906, p. 126. (11) *Buschke and Schmidt*: Deutsch. med. Wchnschr., 1905, xxxi, 495. (12) *Hall and Whipple*: Am. Jour. Med. Sc.,

1919, cxlii, 453. (13) *Lange*: Am. Jour. Roentgenol., 1916, iii, 356. (14) *Hirsch and Petersen*: Jour. Am. Med. Assn., 1923, lxxx, 1505. (15) *Golden*: Arch. Int. Med., 1922, xxx, 629. (16) *Baerman and Linser*: München. med. Wehnschr., 1904, i, 996. (17) *Rosenstern*: Ibid., 1906, p. 1063. (18) *Edsall*: Jour. Am. Med. Assn., 1906, p. 1425. (19) *Heile*: Ztschr. f. klin. Med., 1904, iv, 508. (20) *Neuberg*: Ztschr. f. Krebsforsch., 1904, xi, 171. (21) *Richards*: Am. Jour. Physiol., 1914, xxxv, 224. *Idem*: Science, 1915, p. 287. (22) *Giraud, Giraud and Parès*: Presse méd., 1922, No. 82, p. 885. (23) *Loeb, L.*: Jour. Cancer Res., 1922, vii, 229. (24) *Theis, R. C. and Stone, U. S.*: Jour. Cancer Res., 1919, iv, 349. (25) *Theis, R. C.*: Jour. Cancer Res., 1921, vi, 127. (26) *Whipple, G. H. and Hall, C. C.*: Amer. Jour. Med. Sc., 1919, cxlii, 453. (27) *Whipple, G. H. and Warren, S. L.*: Jour. Exper. Med., 1922, xxxv, 187, 203, 213. (28) *Hirsch, E. F. and Petersen, A. J.*: Jour. Am. Med. Assn., 1923, lxxx, 1505. (29) *Petry*: Ztschr. f. physiol. Chem., 1899, xxvii, 398. (30) *Freund-Kaminer*: Wien. klin. Wehnschr., 1910, xxiii, 10. (31) *Freund-Kaminer*: Biochem. Ztschr., 1910, xxvi, 312. (32) *Koritschoner and Morgenstern*: Biochem. Ztschr., 1920, civ, 259. (33) *Koritschoner*: Biochem. Ztschr., 1922, cxxix, 605. (34) *Freund-Kaminer*: Wien. klin. Wehnschr., 1911, xxiv, No. 51.

25 EAST WASHINGTON STREET.

(For discussion see p. 480.)

MENINGEAL HEMORRHAGES OF THE NEWBORN AND THEIR REMOTE CONSEQUENCES*

BY ALFRED GORDON, M.D., PHILADELPHIA, PA.

FROM the very onset of embryonic life up to the period of birth, the fetus is exposed to multiple damaging influences which have a direct bearing upon the growth of its central nervous system. Lesions of the latter may be numerous and various with regard to their localization, extent, and depth. They are apt to compromise the cerebral functions not only at the time the damage is done but especially during later development of the nervous system. If the infant survives, infirmities are seen not only in the sensori-motor sphere but also and particularly in the mental faculties in which a definite defect is manifest. Among all the multiple facts which are apt to lead to such consequences, only meningeal hemorrhages at birth will be discussed here.

During birth hemorrhages may occur at different levels, either within the nervous tissue itself or close to the cranium. In the latter case the blood may be located between the bone and its periosteum (cephalhematoma), between the periosteum and the dura, or else beneath the dura.

In order to understand the mechanism of formation of hemorrhagic foci, a brief account of the anatomic arrangement of the membranes with their vascular supply is necessary.

The dura mater consists of two layers, an inner and an outer. The outer, which is the periosteal membrane, sends septa into the cranial

*Read, by invitation, at meeting of the Philadelphia Obstetrical Society, October 12, 1923.

cavity accompanied by venous sinuses. They are the falx cerebri, which encloses the superior and inferior sagittal sinuses, also the straight sinus along the line of junction of the base of the falx with the tentorium, the tentorium cerebelli with the transverse and superior petrosal sinuses and the falx cerebelli with the occipital sinus. The septa are in certain places reinforced by aggregation of fibrous bands which enable the head to withstand the great strain in delivery.

During a difficult labor the frequent changes in the shape of the head and the excessive tension overstretch the septa and tears follow which may be complete or incomplete, unilateral or bilateral. When the tentorium cerebelli is involved, the tear is usually found below its junction with the falx. When the falx cerebri is damaged, the tear occurs at the level of its middle two-thirds. Holland¹ found in a series of 167 cases tears in tentorium in 48 per cent and in all of the latter subdural hemorrhages. The fine blood vessels and the large vein on the border of the small circumference of the tentorium may be the sources of hemorrhage, although the usual origin is in the tributaries of the vein of Galen received from the cerebellum and midbrain and from the cerebellar veins entering the straight sinus. The experimental investigations of Holland prove this contention conclusively. These tributary veins are stretched between the fixed point of the Galen vein and the fixed cerebellum. During the excessive tension in difficult labor the apex of the tentorium is drawn upwards and consequently the vein of Galen is twisted at its entrance into the sinus; an enormous distention of this vein and of its tributaries follows. On the other hand the cerebellum is at that time pressed down into the posterior fossa by the undue pressure of the occipital lobes of the brain. Under such circumstances the fine veins tributary to the Galen vein as well as the cerebellar veins entering the straight sinus rupture.

Over the surface of the cerebral hemisphere similar subdural hemorrhages may occur during difficult labor, and it is particularly intense in breech presentations. A common form of such an occurrence is between the layers of the falx cerebri, although less frequent than in tentorial cases. Occasionally there may be a hemorrhage at the base of the brain. Rarely does the pia arachnoid tear but in such cases small hematomata occur. Ventricular hemorrhages, although rare, may nevertheless occur from extreme distention of the fine veins of the choroid plexuses.

The seat of hemorrhages is of importance. In the tentorial cases, for example, even a small blood effusion beneath the tentorium would be of graver consequence than one on its surface however large it may be. Tears in the tentorium cerebelli are the most common and

those of the falx cerebri are rather rare, and in the majority of cases to be found in association with tears in the tentorium.

In considering the causation of meningeal hemorrhages it is extremely important to bear in mind the immediate and the predisposing factors. Infections and intoxications *in utero* may be the direct cause, but the most frequent one is traumatism during labor, extraction of the head in breech cases, forceps delivery for contracted pelvis, presentation of the face or forehead. Tearing of the tentorium has been found in about 70 to 75 per cent of dead fetuses delivered by the breech. Holland, however, believes that in such cases the tentorial condition was due to rapid delivery after version, but if breech delivery is properly managed, there should not be sufficient intracranial tension to produce tearing of the tentorium. The same view can be applied to the cases with transverse presentation. Circulatory interference in the umbilical cord, and congenital malformations of the central nervous system are also not infrequently the cause of intracranial hemorrhages.

The frequency of meningeal hemorrhages in the newly born can be noted in the statistics of G. Hedren of Stockholm,² and of Cruickshank.³ The former examined 700 infant cadavers and found intracranial hemorrhages in about 9.28 per cent. The bleeding was restricted to the meninges in nearly 84 per cent, and cerebral hemorrhage accompanied by meningeal hemorrhage in others brings the total of meningeal hemorrhages to 90.7 per cent. Delivery had been spontaneous in 50 of the 65 cases, and the conditions in both mother and child seemed to be normal in most of the cases. In the 42 purely meningeal cases, the hemorrhage had been supratentorial in 32, infratentorial in 10 and both in six. An analysis of these cases leads to the conclusion that intracranial hemorrhages may occur with rapid and easy spontaneous delivery and they may occur without fractures.

In Cruickshank's account of 200 cases one finds an incidence of 65 cases which showed meningeal hemorrhages of a gross character. In 25 cases there was meningeal hemorrhage associated with hemorrhage into the viscera.

Clinical Manifestations.—Meningeal hemorrhage is more frequently suspected than actually determined during life. Death may ensue in a few hours following the meningeal hemorrhage, but if the infant survives, one observes a state of apparent collapse, cyanosis, low temperature, convulsions in the subsequent days, circulatory and respiratory disturbances, various palsies and contractures. When the infant further succeeds in overcoming the immediate effect of the bleeding the above stormy symptoms gradually subside and the child enters into a chronic state of physical and mental inferiority with a crippled central nervous system. Diplegia, hemiplegia, spastic paraplegia, contractures, athetosis or choreiform movements, convulsive phenomena,

amaurosis, mental deficiency or debility of various degrees, constitute a symptom group which could be placed under one caption of "infantile encephalopathies." Of course, this vast group presents various degrees in its extent and intensity. There are mild cases and profoundly damaged cases. From the standpoint of intellectual development the child may be an idiot or an imbecile or may present only a slight degree of mental arrest of development. It all depends upon the hemorrhage and upon the facility with which the blood may be absorbed or otherwise removed.

The encephalopathies may be early or precociously diffuse, which leads to idiocy; they may be late or delayed, circumscribed and frequently slight which in adult life will be manifested in but slight disturbances of intelligence. The arrest of intellectual development will be especially pronounced and less amenable to improvement in those cases which through hereditary factors are inevitably predisposed to, and prepared for, disturbances or anomalies of cerebration.

A brief physiologic consideration is warranted:

At birth the cells of the central nervous system are fully developed. As to the nerve fibers, full growth is present only in those which control reflex movements, circulation, respiration, and nutrition. The nervous mechanisms of the spinal cord and medulla alone are functioning at that period of life. On the other hand the fibers originating in the frontal, Rolandic, occipital, parietal, temporal regions of the brain, as well as the projection and commissural fibers, become myelinated only some time after birth. It is therefore evident that early symptoms will be only those which are in relation to the physiologic function of the medulla and spinal cord, but manifestations depending upon the function of various portions of the brain will be in evidence ulteriorly and for the above reasons will remain permanent. If we add the compression of the convolutions exercised by the blood, also the possibility of breaking up of the cerebral tissue and infiltration of the latter with the blood, the physiologic damage is then easily conceived.

A brief description of the several clinical varieties may be helpful for a full understanding of hemorrhagic possibilities.

1. *Cerebral Diplegia*.—Two important subvarieties should be considered, one the classical Little's disease, in which there is a spastic paraplegia of the upper and lower extremities, the spasticity being more pronounced than the paralysis, but in which there are no convulsive phenomena and the intelligence is preserved. Improvement is a common occurrence. This form is fundamentally of agenesic order and due to a congenital insufficiency of the pyramidal tract. Premature birth is the original cause.

The second variety is due to destructive lesions of an inflammatory or traumatic origin from a difficult delivery. Here the motor areas

as well as other portions of the cortex, are usually involved, thus producing besides spasticity and paralysis also serious convulsive phenomena and disturbance of intelligence. The condition is persistent. The clinical picture of the last form of cerebral diplegia will vary according to the predominance of involvement of different areas. The association of intellectual phenomena with paralysis and spasticity of the limbs indicates a lesion in the frontal and rolandic areas. Here one or the other may predominate but the presence of epileptiform manifestations is always an unfavorable condition for the intellectual development and in all such cases the mental deficit is much pronounced. Athetotic and choreic movements are also frequently observed in this variety of diplegia.

An interesting feature of the intellectual status in the first variety of diplegia deserves special mention. There is a striking discord between the appearance of the little patients and the real state of intelligence. At first glance the difficult speech and the expression of the face with the mouth open may suggest a low mental state, but an actual test and close observation of their behavior and of their relation to the environment will reveal an integrity of intelligence.

The difference consequently between the two forms of diplegia is fundamental and its second variety is by far more serious than the first. Since it is due to obstetric traumata, the danger of meningeal hemorrhages in difficult labor, cannot be overestimated.

2. *Cerebral Hemiplegia*.—Should the hemorrhage be limited to one hemisphere, hemiplegia with all its characteristics will be the result. In almost all such cases intellectual deficiency is more or less pronounced; all degrees between ordinary mental arrest and idiocy are observed. The inequality and irregularity in the intellectual deficit are due to the great variation in the extent and intensity of the lesions in one hemisphere. As to the hemiplegia itself, it differs from that in an adult, as, in addition to the paralysis, there is considerable lack of development of the affected limbs; they are small not only with regard to the musculature but also to the bony tissue; there are permanent contractures with secondary deformities, hemiathetotic and hemichoreic movements, also frequently aphasia is absent in cases of right hemiplegia.

Not infrequently alongside and in place of complete or incomplete intellectual obliteration other spheres of sensory-psychic activity are developed, but close analysis will reveal that the latter are only of a purely reflex character, are automatic and lack in associative integration, and therefore lose all psychic value.

3. *Double Athetosis and Athetoso-Choreic Movements*.—Encephalopathies in infants may be manifested by a more or less marked deficit in the intellectual sphere and accompanied by bilateral motor phenomena in the form of chorea or athetosis. Here again various de-

degrees of involvement may be present; there are cases with very slight disturbances in the psychic sphere, in which on the contrary the motor manifestations are most conspicuous. There are cases in which the two conditions are reversed. They are all observed in infants in which instrumental deliveries were done.

The three forms of encephalopathies described are the extreme and gross types. There are many intermediary forms which depend upon the portion of the brain affected by the meningeal hemorrhage. Thus any portion of the rolandic area may be affected; the centers of the leg, arm, or face, lips, tongue may be individually compressed. There are cases with a minimum of diplegia; cases with pseudobulbar manifestations; speech defects showing involvement of the speech centers, motor or sensory; exclusive mental defect indicating an involvement of the frontal lobes; persistent and frequent epileptiform convulsions in which particularly the mental development suffers the most, and finally there may be cases with unilateral or bilateral cerebellar manifestations, the so-called cerebellar hemi- or diplegia types, in which cerebellar manifestations alone are conspicuous.

CONCLUSIONS

On the preliminary pages it was mentioned that the causes of meningeal hemorrhages are principally the tearing of the membranes due to overstretching, and rupture of the blood vessels. To produce a tear means the existence of great cranial stress. Since the latter is frequently the result of protracted, difficult labor, where instrumental delivery is practiced, the obstetrician must bear in mind that the force used in forceps application is not to be excessive or not to be applied to the wrong diameter of the head, as for example the antero-posterior. In the latter case the vertical elongation of the head is more than anything else apt to cause overstretching and tearing of the meninges. The forceps is a useful instrument which in many instances has been responsible for saving lives, but it may also be responsible for injuries to fetuses leading to consequences which have a great bearing upon the later physical and mental development of the child.

The preventive aspect of the subject under discussion lies in the consideration of all forces that are liable to lead to tearing of the meninges and of the blood vessels. Wrong presentation and position of the fetus, all other causes of difficult labor, prolapse of umbilical cord, the use of instruments or various manipulations in the delivery of the fetus, are all factors, whose rôle cannot be overestimated in the production of cerebral hemorrhages and of tearing of the meninges. Besides the preventive phase let us consider briefly the therapeutic aspect of meningeal hemorrhage. With a certain degree of possible errors supratentorial hemorrhages, generally speaking, present a some-

what different clinical picture from the infratentorial type. In the former the blood spreads over the hemispheres of the cerebrum; in the latter over the hemispheres of the cerebellum but also into the medulla. In the former the blood cannot go beyond the lower surface of the tentorium; in the latter the blood reaches the subarachnoid space and may extend into the spinal canal.

For these reasons in the supratentorial hemorrhage at birth one finds a bulging fontanelle and a group of nervous phenomena, such as sleeplessness and great restlessness, convulsive seizures, and the condition persists. In the infratentorial cases there is considerable depression, apathy, somnolence, early cyanosis, vasomotor and respiratory manifestations, and rigidity of the neck muscles. In view of the anatomic differences, respiratory and other bulbar disturbances will not be observed in the supratentorial cases. Cyanosis is late and, when it does appear, is not pronounced in the supratentorial hemorrhages, but is early and very much pronounced in the infratentorial cases. The anterior fontanelle bulges early in the supratentorial, but slowly in the infratentorial cases.

For the anatomic reasons just mentioned, in infratentorial cases lumbar puncture may be of considerable benefit. Advocated first by Devraigne⁴ he was rapidly followed by others, and favorable or very satisfactory results have been reported in the literature. Frequently the withdrawal of spinal fluid needs to be repeated. In some cases, as in that of Lippman,⁵ one puncture may suffice. His patient presented convulsions, cyanosis, and rigidity. As the convulsions increased in intensity, Lippman removed 25 c.c. of bloody spinal fluid and complete recovery followed. In Green's⁶ case there were convulsions, cyanosis, and apnea. Four punctures were made and 5 c.c. of bloody spinal fluid were removed each time; all the symptoms cleared up. J. M. Brady⁷ has recently reported very favorable results from lumbar punctures and removal of some spinal fluid. In the supratentorial cases lumbar puncture cannot be of special avail as the blood cannot reach easily the subarachnoid cavity. Surgical therapy is almost the only resort. Early craniotomy is directly indicated. Favorable results from the very nature of the condition can be expected only when an operation is performed very soon (within a few days) after birth. After the clot has already produced damage to the cortical tissue, no relief can be expected. Cushing (*Surgery of the Head*), who obtained four complete recoveries in nine cases, is of the opinion that no hesitation should exist in operating on such young infants in view of the fact that the newborn can withstand cranial better than any other surgical operation, that much less traumatism is created by an operation than by the passage of the head through the pelvis during birth. Cushing claims that with proper hemostasis and proper preservation of the body temperature during the opera-

tion, the possibility of surgical success is assured. In his fatal cases he found extensive extravasation over entire hemispheres; the patients were in a dying condition. Not too much, he counsels, should be attempted at one sitting, and a secondary intervention is advisable.

Henschen⁸ advised in the supratentorial cases, aspiration of the cranial subdural space which should be followed by an incision through the coronal suture. J. M. Brady⁷ suggests in the supratentorial cases to perform first a lumbar puncture and immediately afterwards to make an incision below the parietal suture. It seems logical that in all cases indicating increased intracranial pressure at birth, before a definite localizing diagnosis is made, lumbar puncture should be resorted to at once, since in the infratentorial group it is of definite therapeutic value, and in the supratentorial cases the diagnosis may be promptly established.

REFERENCES

- (1) *Holland*: Reports on Public Health. Report on the Causation of Fetal Death, London, 1922. (2) *Hedren, G.*: Jour. Am. Med. Assn., June 22, 1912. (3) *Cruikshank*: Lancet, London, 1923, 1, p. 836. (4) *Devraigne*: Thèse de Paris de Dutreix, 1905. (5) *Lippman*: New York Med. Jour., 1916, ciii, 263. (6) *Green*: Boston Med. and Surg. Jour., 1916, clxxiv, 247. (7) *Brady, J. M.*: Jour. Am. Med. Assn., 1918, lxxi, 347. (8) *Henschen*: Verhandlung Deutsch. Gesellschaft für Chirurgie, 1912, xli, 271. (For discussion see p. 481.)

REPORT OF A CASE OF ACQUIRED ATRESIA OF THE VAGINA AND THE OPERATIVE RESULT*

BY HERMANN GRAD, M.D., F.A.C.S., NEW YORK

(Attending Surgeon, Woman's Hospital.)

A CQUIRED atresia of the vagina from caustics, applied as a therapeutic measure, is very rare. The following case recently came under my observation.

Miss V., aged twenty-seven, consulted her physician about a leucorrheal discharge prior to her sailing for an extensive trip. Her physician told her that, as there would be no opportunity for a course of treatment he would make one strong application, the effects of which would wear off by the end of her ocean voyage. Her physician made the application and she was immediately seized with great pain and had to go to bed. She suffered great pain all night and the next morning went aboard the ship on which she was sailing. During the entire ocean trip she remained in bed and was in constant pain. On landing she was sent to a hospital in London, where a diagnosis of carcinoma of the cervix was made and a specimen was taken for examination and was reported negative. Under local treatment and irrigation she improved rapidly and in ten days was able to leave the hospital. There was no further vaginal discharge and she considered herself recovered.

*Presented at a meeting of the New York Obstetrical Society, October 3, 1923.

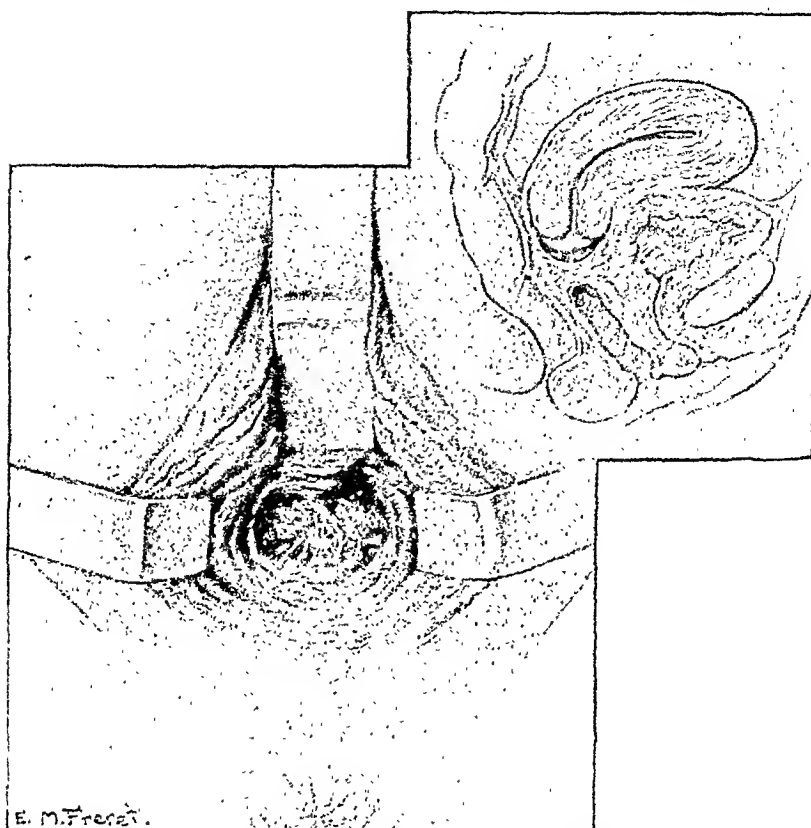


Fig. 1.—Atresia vagina. Scar tissue in front of cervix uteri. Right hand figure shows side view.

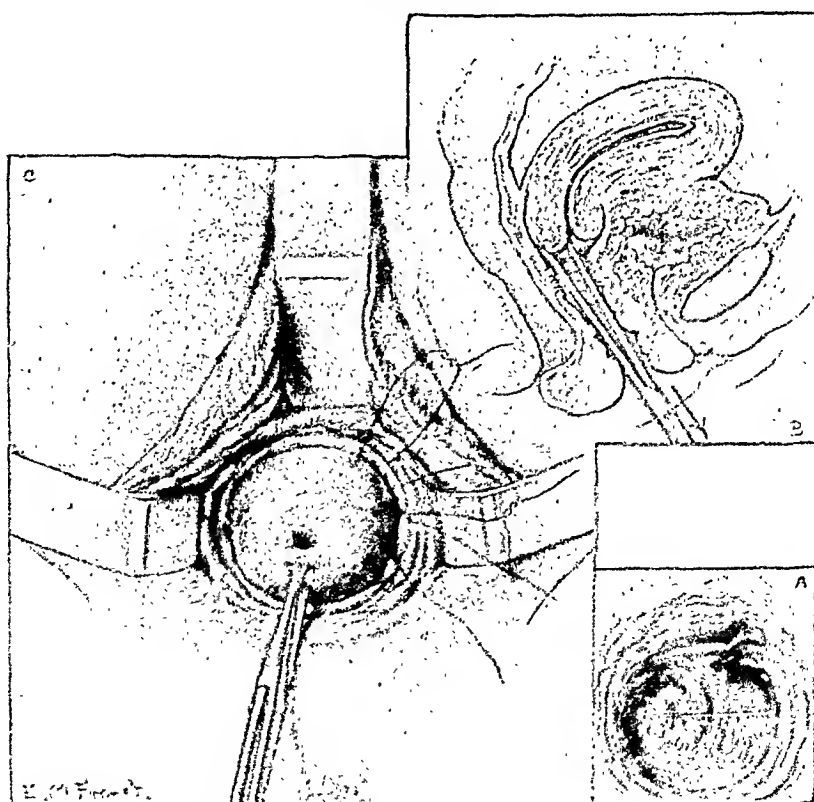


Fig. 2.—A, Shows incision in scar tissue; B, cervix uteri grasped with volsellum; C, cervix encircled by scar tissue.

When her next menstrual period came around she was taken with severe abdominal cramps but no flow occurred. This continued for six months. Previously her menstruation was perfectly normal. During August, 1923, she was obliged to go to bed for five days, with more pain than during the previous five months. She went to Paris and at the American Hospital was told that the only thing for her to do was to submit to a hysterectomy. She then came home and presented herself to me for examination. The latter revealed a short vagina with a complete atresia at the upper third; the cervix could not be palpated; the uterus appeared to be enlarged and the adnexa appeared to be normal. Further inquiry brought to light the fact that the patient had nitric acid applied to the uterus and cervix. The atresia was the result of this application.

The patient was sent to the hospital and under anesthesia the scar in the vault of the vagina was incised. Immediately about four ounces of dark blood escaped, evidently retained menstrual blood. The problem was how to prevent the recurrence of this atresia, and the thought came that if the cervix, after it was dug out of the adhesions, could be pulled down sufficiently so that normal mucous membrane could be sutured around it like a cuff a subsequent atresia will be prevented. Accordingly the incision was enlarged and the cervix dug out of its adherent position and pulled through the incision in the scar of the vagina. The vaginal mucous membrane was then sutured to the cervix. The cervix was red and denuded of its mucous covering. The wound healed and the cervix became covered by an epithelial lining and the patient had one scanty menstruation. The drawings show the steps of the operation.

FORTY EAST FORTY-FIRST ST.

HEMATOCOLPOS IN A CHILD OF SIX WEEKS*

BY G. L. MOENCH, M.D., NEW YORK CITY

(Assistant Professor of Gynecology, Post Graduate Medical School and Hospital, New York City.)

RECENTLY I was called to see a child of six weeks (L. K., Borough of Brooklyn, 1923, No. 2298, Office of the Chief Medical Examiner of the City of New York) found dead in bed at 6 A. M. by her mother who thought she had crushed her as there was bloody froth at the baby's mouth. The mother had given the baby the breast two hours before death but the child had not nursed well. There was no history of cough, fever or any illness. Urine and feces had been normal; the infant had always been weak and had cried only feebly.

The autopsy showed a fairly well nourished, apparently perfectly normal, white female child about six weeks old. External signs of violence were absent. The heart showed a large patent foramen ovale. The lungs were firm, small and pink and not fully expanded. There was marked pulmonary edema. The peritoneum of the anterior wall of the lower abdomen was smeared with old tarry blood. The left ovary was normal for the age of the child; the right one, however, was composed mainly of a cyst about the size of a large pea filled with old blood. The uterus measured fifteen by eight by five millimeters and was set on a round cystic mass the size of a golf ball which proved to be the dilated, but otherwise normal, vagina filled with old blood. The hymen was imperforate; the cervix slightly

*Presented to the New York Pathological Society, Oct. 10, 1923.

eroded. The interior of the uterus was clean; the endometrium that of a child of six weeks. There were no evidences of hemorrhage anywhere else in the body and the rest of the autopsy was negative.

Microscopic sections simply corroborated the gross findings; the right ovary showed the hemorrhagic cyst which had no lining; the rest of the ovary was like that of any infant as was also the left ovary. The tubes were normal and did not contain any blood; the vagina was normal.

Diagnosis.—Congenital atelectasis of the lungs; pulmonary edema; patent foramen ovale; hemorrhagic cyst of right ovary; hematocolpos; erosion of cervix.

It is difficult to arrive at any definite conclusions about this case. I believe there are two possibilities to consider; one is precocious menstruation, the other, an acute inflammation with hemorrhage. While it is true that infants sometimes have a bloody vaginal discharge soon after birth, this is hardly ever more than a slight amount of bloody mucus. A definite hemorrhage, such as was present in this case, does not occur, but of course is within the range of possibility. However, if we accept precocious menstruation as an explanation here we must also assume that, after the hemorrhage occurred, degeneration of the endometrium and restitution to that ordinarily found in the infant took place as no signs of precocious endometrial development were found at the time of death. Nevertheless, the hemorrhagic cyst in the ovary would favor such an interpretation.

The second possibility, that of an acute inflammation, seems less probable. We would have to presuppose an acute vaginitis accompanied by hemorrhage and by extension into the right ovary. The only support for this hypothesis is the fact that a number of pathologists claim that an imperforate hymen is never congenital but always due to an inflammation.

I do not believe that the slight congenital erosion of the cervix, present in the case, can in any way be made responsible for the hemorrhage. A hemorrhagic diathesis likewise seems improbable as no lesions indicative of such a condition were found.

THIRTY EAST FIFTY-EIGHTH STREET.

Society Transactions

THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SIXTH ANNUAL MEETING

PHILADELPHIA, PA., SEPTEMBER 19-21, 1923

(Continued from March issue.)

DR. ASA B. DAVIS, New York, N. Y., read a paper on **Extraperitoneal Cesarean Section.** (For original article see page 373.)

DISCUSSION

DR. JAMES A. HARRAR, New York City.—This is an operation which every one who performs cesarean section frequently should know because it is sometimes of distinct value. Every now and then there will be cases that demand such an operation. The description sounds rather elaborate, but in the performance of it, it is interesting to see how easily one can dissect through the areolar tissue with fingers and come upon smooth purplish surface of the uterus ready for incision. There is very little cutting done after the abdominal wound is open, until the surface of the uterine muscle is reached.

DR. OTTO H. SCHWARZ, St. Louis, Missouri.—The time this operation requires is, I think, of great importance. The cases in which the operation seems applicable have already been subjected to the strain of a prolonged labor, traumatism, and in some instances, an anesthetic, and therefore are notably poor surgical risks.

The remarkable results obtained in a series of sixty-four cases at the Johns Hopkins Clinic reported by Harris, in which hysterectomy was done, resulted in only three deaths, and none was due to peritonitis or bacteremia. I feel that this method of dealing with these cases, offers, by far, the best prognosis for the mother.

DR. JOHN O. POLAK, Brooklyn, New York.—Extraperitoneal cesarean section is of particular interest to me as I happened to have had the opportunity of assisting my predecessor, Prof. Jewett, in one of the cases referred to by Dr. Davis. I had not seen the operation again until I saw Dr. Davis do it. The whole point, it seems to me, rests upon whether the patient is potentially infected or not. There is no cesarean section, flap operation, Doederlein operation, or the rehabilitation of the old Thomas operation, that will save the infected patient. I think Dr. Davis will agree with me in this. There are some cases, I can conceive, where the handling has been such, though we have no definite evidence of infection, but where extraperitoneal delivery offers the safest route. We have, of course, in Brooklyn, been doing a modification of the Doederlein operation, the so-called double flap operation of Beck. In this way we have avoided a possible leakage. Patients who have undergone cesarean section die from two causes, aside from hemorrhage, either from a spreading peritonitis, or a general infection. No operation, save hysterectomy, will prevent a general infection. The flap operations will prevent leakage and general peritonitis.

DR. ABRAHAM J. RONGY, NEW YORK CITY.—I think Dr. Polak is right, when he states that if infection has set in, no matter what operation one does, the patients usually die. I have come to the conclusion that no matter how long a woman has been in labor, as long as she has not been traumatized by instruments, I will take a chance with a classical cesarean section. If the woman has been in labor for forty-eight hours or longer, and she is brought into the hospital slightly traumatized from instrumentation, with a torn cervix or vagina, and the baby is alive, pubiotomy is the operation of choice in those cases. I reported before this Association twenty-seven cases of pubiotomy, of which I personally did sixteen, and saved all the mothers, with a mortality to the children of 27 per cent. When the disproportion is out of proportion, pubiotomy must be eliminated; I feel that in such cases craniotomy is indicated, because these patients have a better chance by craniotomy than by any kind of cesarean section you may perform.

We must take into consideration the secondary results of such operations, although personally I have had no experience with the particular operation described by Dr. Davis. If a patient once gets a hernia along Poupart's ligament, there is no way of repairing it and that woman will have a hernia the rest of her life. What happens, if the woman should become pregnant again and has a hernia in the lower portion of the abdomen, which cannot be supported or corrected? The older one becomes, and the more one sees of neglected cases of labor that call for operation, the more one realizes that any operation, which will keep the woman in the operating room the shortest length of time, should be the operation of choice. Occasionally we may sacrifice a badly damaged baby for the sake of the mother.

DR. HUGO O. PANTZER, INDIANAPOLIS, INDIANA.—We all have been impressed with the unfavorable results following cesarean section in infected cases. Sodium salicylate, as an antiseptic remedy, has powerful effect not yet sufficiently recognized by the profession. I had the virtues of this remedy most vividly impressed upon me while in attendance on the von Jacksch's clinic at Vienna, in 1885. A postparturient woman was presented who had developed grave sepsis and, latterly pyothorax, in the obstetric division of the All gemeine Krankenhaus. She had been taken first to the surgical division, but there was referred to the internists' division because the surgeons said they did not operate on dying women. The patient showed a temperature of 104°, fleeting pulse of 180, comatose condition with wild carphologia, very dry skin and tongue, the latter, it seemed, in danger of breaking, as it wagged against the teeth in a muttering delirium. The case seemed absolutely hopeless. Much to my surprise von Jacksch said, "We will give this patient fifteen grains of sodium salicylate hourly, until eight doses are given, thereafter one-half that dose every four hours," and, concluding, "when you return tomorrow our patient will have a moist skin, clear sensorium, and will be asking for food and drink."

Wood, our authority in *Materia Medica* in those days, taught that sodium salicylate should be given in very small doses, it being a very dangerous remedy. I looked for nothing good to come to our patient. However, to my surprise, von Jacksch's prophesy came true. Since then I have given this remedy extensively, with ever increasing confidence. In quite a number of cases like these under consideration by the essayist I have done cesarean section after large doses of sodium salicylate had been given, preferably by rectum, and have had most remarkable recoveries.

DR. JAMES F. BALDWIN, COLUMBUS, OHIO.—I would like to say a word in regard to the original Porro operation in these cases. I performed the first Porro operation in Ohio, the third successful one in the United States. The operation

was done a good many years ago at two o'clock one morning in a cellar. The woman had an infantile pelvis. The child was alive, the patient's general condition was not bad, but the surroundings were very bad. I carried out a typical Porro operation, brought the uterus out, transfixed it at the cervix, put a rubber tube around, cut the uterus off, and closed the incision around the stump. She made a beautiful recovery, and died only a few years ago. The baby lived several months, dying of some acute throat trouble. I have had a number of cases that were septic, have operated on them, removed a living child, and made a hysterectomy, panhysterectomy if the cervix was bad, and supravaginal hysterectomy (subtotal) under other circumstances. These women have all recovered, with the babies alive.

I noted with a great deal of interest the laparoelytotomy operation when brought out by Dr. Thomas, but it did not impress the profession favorably and soon lapsed into innocuous desuetude. I would rather do a panhysterectomy or supravaginal hysterectomy, or even a Porro operation, than do the operation the essayist has described.

DR. DAVIS (closing).—I have employed this technic in a class of cesarean cases in which we have very good reason to believe that the classical operation would have proved fatal. Dr. Polak states truly that in cases generally infected with vigorous strains of virulent bacteria, the patient is not rescued by extraperitoneal or intraperitoneal section nor by the Porro operation. From experience I am convinced that, had these twenty-eight cases reported, been delivered by classical cesarean section, nearly all of them would have died within the first few days. The technic is difficult and intricate. There may be a simpler way to arrive at equally good results in presumably infected cases. I believe that it is a method that is worth while. Twenty-six of the twenty-eight cases recovered. At least six of these women have since borne children, two died. One was undoubtedly of the type referred to by Dr. Polak. The other died from pneumonia plus a long difficult labor and a severe operation.

DR. JOHN O. POLAK, Brooklyn N, Y., read a paper entitled **Is Cesarean Section Justifiable in Ablatio Placentae?** (For original article see page 384.)

DISCUSSION

DR. ABRAHAM J. RONGY, NEW YORK CITY.—I have not had as much experience as Dr. Polak in dealing with cases of ablatio placentae, but I have had some rather tragic experiences. There is no question that these tragic cases require the immediate opening of the abdomen, for the reason that very many of them are mistaken for spontaneous rupture of the uterus.

I have had two cases in the last two years. One was a woman in labor forty-eight hours without progress. The family physician telephoned for me to come and see the patient, saying that she required cesarean section. When I saw the patient she was in shock, and I thought the uterus ruptured. I opened the abdomen and found spontaneous rupture of the uterus with the placenta bleeding.

Only recently I had another patient, in the fifth month of pregnancy. She developed pain in the abdomen and went into shock. For a while I did not know what was the matter with her; I could not make out a tumor. When she did not improve, I opened the abdomen and found spontaneous rupture of the uterus. She died. Not only does a case of ablatio placentae require cesarean section, but we must consider it as an acute abdominal condition with the possibility of spon-

taneous rupture of the uterus, and if we can act early we will save a number of patients.

DR. OTTO H. SCHWARZ, ST. LOUIS, MISSOURI.—Dr. Polak cites a case in which there was extreme torsion of the uterus, and that this was the primary factor in this case is quite apparent from the picture. However, I do not believe that is a common cause of *ablatio placentae*. The underlying condition is a sudden rupture of some vessel of small or large size, and therefore I feel the term *utero-placental apoplexy* is the term which should be applied to this lesion in preference to the term *ablatio placentae*.

In a recent study which I have previously mentioned, I have noted in a few cases of toxemia that vessel changes occur analogous to the changes which are seen after delivery, so well described by Goodall. I feel these changes are the underlying condition. It is well known that in hypertension intimal changes take place in other vessels of the body. In the hypertension cases the intima of the uterine vessel showed a marked thickening with the other changes. As the degenerative changes advance, its wall becomes definitely impaired. These vessel changes occur in the spongy decidua, and with the increased pressure a rupture is very apt to take place.

I felt that smaller retroplacental hemorrhages are similarly explained. I have demonstrated vessels in the spongy decidua which appear to have more or less aneurysmal dilatation, and under such conditions, I believe rupture can easily take place. These changes take place as well in the veins but it is a different type of change, and with a rupture of such a vessel or the interference with the maternal blood flow, thrombosis may take place. I believe the finding of thrombosis in the uterine wall does not necessarily mean that it is the primary factor.

DR. LOUIS E. PHANEUF, BOSTON, MASS.—I would like to mention briefly three tragic cases of premature separation of the placenta which came under my observation within a short period of time.

The first patient was taken with a sudden pain in the abdomen while riding on a street car. She was brought to the hospital bleeding and in extreme shock. The diagnosis was made, the abdomen was opened, and it was found that she had ruptured her uterus in the median line. The rent was enlarged and the child was delivered through it. The patient was transfused immediately, and despite that fact died on the fifth day. The second case was one that gave a history of trauma; she had a partial rupture of the uterus near the median line through which the fetus was extracted. She recovered without transfusion and without anything else being done. A year and a half later I did a low cervical cesarean section in her case and she had an easy convalescence. A third case came to my attention within two months. This woman had a pulse ranging from 140 to 150 with a complete separation of the placenta and a dead fetus. The uterine body was ecchymotic but the lower segment appeared to be normal. I did a low cervical cesarean section fearing that she could not stand a hysterectomy and she recovered without transfusion.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—I want to further emphasize the points that have been placed before you, but I have found that it is a good idea in eclampsia to get a clear picture of the pathology. In the severe cases mentioned by Dr. Polak there is a hemorrhagic condition of the myometrium, and as Dr. Schwarz has pictured greatly dilated vessels. In many cases there is very marked red blood cell extravasation, so that a cross section of the myometrium looks as if the entire structure were involved in the hemorrhagic process. When that is the case, the picture gives the indications for treatment.

DR. POLAK (closing).—Of the three charts I showed you, one represented the traumatic type. We have a large number of these cases in Brooklyn during the Coney Island season. This type of woman is usually leading one child by the hand, carrying another on her arm, and a third in her abdomen. In her endeavor to get on the car after lifting the oldest child on, the car is started suddenly and she is thrown against the seat in front of her. It is surprising how the number of cases of separation of the placenta increase during the summer in Brooklyn. That is the traumatic type.

The second picture was one of the toxemic type, a placenta with numerous infarcts, while the third slide represented the opaplastic type, with thrombosis in the uterine wall.

We really do not know what changes these vessels undergo that make them more susceptible to rupture, but we do know there are certain cases preceded by toxemia which show separation of the placenta, and they are undoubtedly of the apoplectic type as mentioned by Dr. Schwarz. There are other cases in which there is extreme torsion of the uterus which seems to be a factor on top of the vessel change.

In regard to treatment, there are some of these cases in which we can do a section. But where there are changes in the uterine muscles and when cutting through the uterus, we find it edematous and thrombotic it should come out. In the tragic case we should have a donor ready for transfusion then evert the uterus, clamp down on both broad ligaments, and start transfusion. We can then take as long as we want for the operation, for the patient loses no further blood.

DR. ROSS MCPHERSON read a paper entitled *Treatment of Placenta Previa*. (For original article see page 403.)

DISCUSSION

DR. EDWARD SPEIDEL, LOUISVILLE, KY.—The subdivision of these cases into the two classes given by the author of the paper is an excellent one. It is surely more rational than attempts at vaginal examination to determine the extent of encroachment of the placenta on the internal os, thereby starting a new hemorrhage and very likely infecting the patient.

The treatment of the condition should be based on this subdivision also, and preliminary to the treatment we should try to prevent infection by simply cleansing and carefully scrubbing the vagina with soap and water and use irrigation afterward. With such a preliminary cleansing I have never seen infection follow vaginal delivery of placenta previa. The course we follow is according to this subdivision. If the child is nonviable the membranes are ruptured and a considerable quantity of the waters allowed to escape; a No. 2 Voorhees bag is then inserted through the cervix, and when expelled the cervix is sufficiently dilated to bring down a leg and allow the woman to deliver the nonviable fetus. In a case further advanced a No. 3 bag is introduced without rupturing the membranes; the woman will have sufficient labor pains to force the fetal head through when the bag is expelled, if not, then the gloved hand is inserted, a foot brought down, and the child carefully delivered in order that it may live. In a case of central placenta previa, if the patient is not near term, say seven and a half or eight months, vaginal delivery can be effected.

DR. ABRAHAM J. RONGY, NEW YORK CITY.—The cases of placenta previa that present themselves during the period of viability of the child, should be divided into two general groups;—those patients that are in labor, and those that are not. In cases of bleeding in the eighth or ninth month, when the cervix is not dilated

and rigid, we have no means of ascertaining whether the placenta previa is marginal or central. In other words, we are groping in the dark, and in these cases I agree with Dr. McPherson that cesarean section is the only operation of choice and by so doing we save the greatest number of mothers and a great number of babies. In addition, I think, every time we do cesarean section for placenta previa the uterus should be packed for possible hemorrhage, particularly the lower segment. In patients, who are two or three fingers' dilated, we can differentiate whether the case is one of placenta previa centralis or one of placenta previa lateralis, and we can select the method of interference. Patients, whose hemoglobin goes down to 70 or 60, due to bleeding, should not be meddled with, and the sooner such patients are delivered the better for the mother and baby. Once a woman has a hemoglobin of 60 or 65, due primarily to bleeding, a second hemorrhage may kill her, even if she loses only a small quantity of blood.

DR. OTTO H. SCHWARZ, St. Louis, Mo.—I would like to ask Dr. McPherson whether in cases in which he does cesarean section he always transfuses before doing that operation and the use of the bag for the control of hemorrhage?

DR. MCPHERSON (closing).—In regard to Dr. Speidel's remarks about the Voorhees bag, I will say that the use of the Voorhees bag is a well recognized method of treating these cases. The only objection to it is the danger of its being suddenly expelled with resultant hemorrhage. Theoretically it is cleaner. I have twice had the Voorhees bag expelled before I was able to do anything. The woman had a good hard pain and bled to death before anything could be done. Packing controls hemorrhage until you take it out; if you have such an accident once it is excusable, but if you have the same accident happen twice, it is not so excusable, and that is the reason I prefer packing to the use of the bag.

In answer to Dr. Schwarz about transfusing before doing cesarean section, I do not think it is necessary to resort to transfusion unless there are indications for it. If the patient needs transfusion, I have things ready so that it can be given immediately. If she comes into the hospital exsanguinated, it is necessary to transfuse her before operation. I have seen cases that bled straight through, the blood coming out at the other end; in other words, it went into the vein and came out of the vagina.

I have not made a practice of packing these cases after operation, and I believe that the suturing of the incision is sufficient irritation to cause contraction of the uterus. Dr. Rongy is theoretically correct, but these patients have not bled to death after they were operated on. I would rather not pack them after opening the uterus.

DR. PAUL TITUS AND VERNON L. ANDREWS, of Pittsburgh, Pa., presented (by invitation) **A Study of Frozen Sections Through the Uteri of Women Dying During Labor.** (For original article see page 396.)

DR. LEWIS F. SMEAD, Toledo, Ohio, read a paper on **Acute Pancreatitis.** (For original article see page 431.)

DISCUSSION

DR. FREDERICK S. WETHERELL, SYRACUSE, N. Y.—I should like to report a case I had recently of acute pancreatitis. From an etiologic standpoint, this case was interesting, in that the patient was just eight days over her crisis from

a rather mild lobar pneumonia. She was seen by her family physician because of abdominal pain, was given morphine, and seen again eight hours after that. I saw the case with him, and the clinical picture and physical findings were those of an acute cholecystitis. The patient was immediately sent to the hospital. There an internist saw her. No urinalysis was made during the attack of pneumonia or up to the time of her admission to the hospital. Further examination with better facilities in the hospital disclosed an abundance of sugar in the urine which led us to think of the possibility of pancreatitis. The abdomen was opened by a transverse incision and extensive white plaques, postperitoneally, were seen. An attempt was made to explore the lesser omental bursa through the epiploic foramen, and great difficulty was experienced in getting in there, and all the tissues were extremely friable. A large drain was inserted into the omental bursa and the abdomen closed. The patient died in twenty-four hours. At autopsy there was no evidence of any kind of obstruction of the pancreatic ducts, no cholelithiasis, but very extensive fat necrosis throughout the abdomen.

DRS. CHARLES GORDON HEYD, WARD J. MACNEAL and JOHN A. KILLIAN presented a paper entitled **Hepatitis in Its Relation to Inflammatory Disease of the Abdomen**. (For original article see page 413.)

DISCUSSION

DR. GEORGE W. CRILE, CLEVELAND, OHIO.—I would like to ask a few questions. First, whether during the time these observations were made the temperature ranged high or low. Second, whether the pathologist noted any relation to the changes that take place in the intracellular structures of the blood vessels, the connective tissue, etc. Third, whether he noticed a change in the stainability of the cells of the liver themselves, and whether the acid alkali balance changed.

I saw many pale areas in the liver which might possibly be thus interpreted.

DR. JAMES E. DAVIS, DETROIT, MICH.—I want to ask one or two questions. First, whether lysis of cells in the liver tissue has been controlled; or, in other words, how long after removal of the tissue was complete preservation established?

It is a common observation in general septic conditions within the abdomen to see not only changes similar to the ones we have had pictured in the liver but in the spleen, in the kidney, and in a lesser degree in other tissues. I should like to ask if any observations have been made as to whether the conditions were primarily in the liver or did they show first in other tissues?

DR. W. WAYNE BABCOCK, PHILADELPHIA, PA.—I should like to ask a question with regard to the calcium content of the blood, which usually does not show a reduction corresponding with the reduced coagulation point. Nevertheless, the intravenous use of calcium chloride has been advocated in hepatic and pancreatic disease with a tendency to hemorrhage, and Dr. William J. Mayo had called our attention to the fact that following the use of this drug, operations for these conditions have shown a lessening in mortality of 50 per cent. Is this injection of real value?

In a few cases, using 200 to 500 c.c. of a 2 per cent solution of calcium chloride, I have seen marked improvement follow, but was the improvement due to the calcium? In a supposedly hopeless case of hemorrhagic pancreatitis and in a case of sudden collapse after cholecystectomy the patients rapidly revived after the injection. The dilute solution seems safer to use and less prone to cause a severe reaction than the concentrated solution usually employed. It is possible that our patients would have improved from a simple saline injection.

DR. HEYD (closing).—We found out that there was a difference in the staining affinities in liver cells, alkalization showing in the protoplasm. I personally carried the specimens to the laboratory within two or three minutes after completion of the operation. They were in an excellent state of preservation. We have used calcium chloride in gastric hemorrhage and in chronic jaundice. We have used both the 2 per cent and 5 per cent solution and, as a rule, after the 5 per cent as after the 2 per cent obtained the same reaction.

DR. HENRY SCHMITZ, Chicago, Ill., presented a paper entitled **The Clinical Significance of Chemical and Serum Analyses of the Blood of Uterine Cancer Carriers Subjected to Measured Radiation Doses.** (For original article see page 449.)

DISCUSSION

DR. JAMES E. DAVIS, DETROIT, MICH.—Unless we know something of the *modus operandi* we cannot get the understanding we need for differentiating the best forms of treatment. I think it is exceedingly profitable to have this subject attacked from the standpoint of physiologic chemistry. After all that has been said, the vital thing to be considered is not altogether the question of whether every cancer cell in the field is killed. A change from what we call a normal cell, or relatively normal, to the cancer cell may go on when all the predisposing conditions are present. We do not understand the change of cells from benignancy to malignancy. I am not so sure even after we have the malignant cell killed but what some of the normal cells may have the conditions right to become cancer cells. Another important point, we may think a cancer cell is killed. The histologic appearance, the chemical tests we may apply, will all seem to indicate the cells are dead, yet I have seen more than once a tissue that if it were examined today one would say it was absolutely beyond the possibility of continuing life, yet if you examine it three weeks later you will find a nest of cells beginning to grow. That brings up the problem that many of our diagnoses made at one period of time may, with all the knowledge we have, be absolutely in accordance with the facts, and we render a diagnostic decision that is not going to hold after a lapse of time which will bring about a revivifying of the cells.

DR. SCHMITZ (closing).—Dr. Davis is correct in what he has said about the study of cancer cells. Let us take a cancer located in an area where it becomes again subjected to trauma or function peculiar to that particular region of the body; it will invariably recur after successful radiation treatment. A cancer of the tongue or of the lip may be treated successfully with radiation therapy, but if that growth is not afterwards removed surgically there will be a recurrence. In the uterus the conditions are different. Physiologically the function of the uterus is arrested and if sexual intercourse is prohibited we will not observe recurrences after radiation treatment.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF OCTOBER 12, 1923

THE VICE-PRESIDENT, DR. NORMAN L. KNIPE, IN THE CHAIR

DR. ALFRED GORDON (by invitation) read a paper entitled **Meningeal Hemorrhages of the Newborn and Their Remote Consequences**. (For original article see page 462.)

DISCUSSION

DR. GEORGE M. BOYD.—This study shows the importance of having more closely associated with us the neurologist. It is surprising the amount of trauma the baby seems to be able to endure without the evidence of meningeal hemorrhage, immediate grave injury or remote injury. I would like to ask Dr. Gordon in what proportion of cases of mental defects or permanent injuries of brain origin he has seen, could he positively attribute the injury to trauma of labor and how he feels regarding other conditions predisposing to these injuries such as toxemia, lues and inherited taints. Do not these, in many cases, explain the condition rather than the trauma? I believe that we are more apt to have injuries from too hurried labor than too prolonged labor. It is important to watch the patient and keep in mind the fact that labor prolonged may damage as well as labor hurried. As to the breech, Dr. Gordon has told us there exists a greater proportion of brain injuries and meningeal injury following extraction. This is logical. I am also convinced that prematurity predisposes to these injuries. Ehrenfest, in his book "Intracranial Lesions," laid stress upon the fragility of the vessels and the dura.

DR. PHILIP F. WILLIAMS.—I should like to ask Dr. Gordon to recapitulate the effects of the minute hemorrhages; those commonly supposed to result from prolonged labor rather than faulty application and traction of forceps.

DR. DANIEL LONGAKER.—I believe we obstetricians should lose no opportunity to familiarize ourselves with, and promptly recognize these lesions. The splendid book of Ehrenfest is in line with the excellent paper we have heard tonight. There are some fallacies in this subject that could be alluded to, for instance the fallacy of the original breech and the damage done incident to head-last labors. That is one thing, the after-coming head in a version is another thing. We must not forget that pelvic narrowing directly causes the breech to present; that under these circumstances we do not have the head to fit into the pelvis, which after all is the best pelvimeter. There is no doubt that the bad results attributed to head-last labors are due to the causative pelvic anomaly and not to the head last *per se*. Again and again I have taken internes and allowed them to do, not one, but a number of versions, as high as ten, in one instance twelve, without the slightest fault and without the slightest injury.

So much to illustrate the fallacy of conclusions based on the mere fact of after-coming head as existent in versions in contradiction to original breech. I believe that unskillful application of forceps is capable of doing great harm, even their use in skilled hands is not always unattended by damage. Fortunately in many of these cases this damage done is so great that there are no remote results. The babies die promptly. Diagnostically and therapeutically much can be done in the early stage of cerebral injury, such as prompt and repeated spinal puncture. The clotting time of the blood will usually be found delayed; by injection of whole

blood into the lumbar muscles, (20 to 30 c.c.) the clotting time is shortened and the repeated spinal puncture has a wonderful influence in clearing up some of these cases and preventing what otherwise would be disastrous remote results.

DR. NORMAN L. KNIPE.—I desire also to ask whether Dr. Gordon's results of version were in statistics on old version, or as it has been done in the last year or two? There is a great difference. I was taught that when a child was born up to the umbilicus we must deliver for fear that it might smother to death. That is not the modern idea of version. I wonder whether the same number of cranial injuries occurred as the result of modern version.

DR. ALFRED GORDON.—Dr. Boyd's query in regard to the percentage of defects due to difficult labor is rather difficult to answer. What he said is perfectly correct, that in a number of instances this is not the only element that enters—toxicity and infection, hereditary syphilis, congenital syphilis, tuberculosis, all kinds of constitutional diseases and finally heredity should be considered. Heredity is a very important factor. In such cases the individuals have a peculiar fragility. To give an exact statistical account with regard to defects, mental or physical, of the central nervous system, it is exceedingly difficult, for the reasons mentioned. We are dealing here not with mathematical figures, not with mathematical individuals, but with individuals who may present at the same time all sorts of congenital defects. We cannot say in every case that it is due exclusively to that. I may say that in some cases in spite of heredity of tuberculosis and in spite of heredity of syphilis, the children after a difficult labor are still born normal. I mean so far as gross morphology is concerned. We have the right to say that a difficult labor plays a prominent rôle in the production of trauma. As Dr. Longaker said, children frequently die at birth and if they survive, the above mentioned elements will have their effect: the child who had a tear and hemorrhage in the meninges is less apt to develop into a normal child if he is already congenitally or hereditarily a defect. Children may be born of normal parents, and in spite of a difficult labor, may resist the damage for a longer time than the other kind. To give you exact figures in regard to the exclusive effect of difficult labor is impossible. I have searched the literature in preparing this paper through and through, and it was very difficult to find such data either among the obstetricians or neurologists. I had the subject in mind. It would have been very important to know the figures. It would have been more striking and convincing if we could get exact figures as to the exclusive effect of difficult labor. Prematurity, of course, is a very important predisposing element; Little's disease is due to prematurity. I wish to say that prematurity itself, outside of local trouble is very frequently—I would not say always—associated with hereditary syphilis or tuberculosis or some blood dyscrasia. As to what Little observed and attributed exclusively to the fact of premature birth, we may say syphilis is back of it in a number of cases. Nervous syphilis of the brain, cavities in the cortex and in the midbrain, porencephalon, or other malformations, microcephalus or microgyria, are very apt to produce during birth additional damage, particularly meningeal hemorrhage. The very important point was brought out by the President, and by the other speaker who inquired about minute hemorrhages. We find sometimes accidentally at autopsy minute, very small, disseminated, diffuse hemorrhages. We have no statistics in regard to that. We know that very minute hemorrhages of diffuse character may not produce gross damage such as cerebral diplegia, but they have a special effect upon the mentality of the child. Of course if you have a number of minute hemorrhages in the motor area alone you will have motor symptoms. Minute hemorrhages are apt frequently to delay the mental development of the child. It is a very important subject. Now as far as the effect of version is concerned from a technical

standpoint, I hope you will not ask me to take up a subject of that kind. I am not competent enough to talk about modern version and former version, but the statistics have reference to the old version; I have no statistics in regard to new version. The object of presenting this subject was not for the purpose of teaching you anything, but to bring into closer contact the obstetrician and the neurologist. We know now that in medicine there are so many points of contact in various branches of learning; there is no such thing as pure ophthalmology, or pure obstetrics. We must all call upon and assist each other but if we lock ourselves in our sanctuary and say "We have no right to go out of neurology," or "We have no right to go out of obstetrics," we are the losers. The studies of medicine at the present time are so broad that they open our eyes to the multiple points of contact between various branches. A man who, for instance, deals with cerebral lesions, you will readily understand, has to consider a great variety of diagnostic possibilities before he decides on a cerebral lesion. Look at the biologic situation, the question of metabolism, the question of state of the blood, the question of syphilis, the question of the spinal fluid. There is the greatest interdependence and contact between various branches of medicine and it is exceedingly important that their representatives should know each other more closely.

DR. GEORGE M. BOYD.—I would like to ask Dr. Gordon a question in regard to epilepsy. Has he ever had under his care an epileptic where he felt that the etiology of this trouble could have been in any way attributable to difficult labor? I have talked from time to time, with a number of neurologists on epilepsy and none has felt that the trauma of labor necessarily had anything whatever to do with the etiology of this ancient and mysterious disease.

DR. ALFRED GORDON (closing).—The subject of epilepsy is a very vast one. We have to consider two kinds of epilepsy. One is organic and due to direct damage of the motor area of the brain. Suppose a child had a hemorrhage over the motor area; as long as the clot remains there, it will irritate the brain and produce focal epilepsy, what we call Jacksonian epilepsy. There is another kind of epilepsy, the idiopathic; to cover our ignorance it means a disease by itself. In this kind of cases the clinical manifestations are not confined to one side. Dr. Boyd reports the case of a child born of normal labor, that means without a trauma, but having developed epilepsy. In such a case there is something back of the epilepsy. We often find children born without difficulties and a short time later develop convulsions. In such cases we cannot blame the convulsions on the confinement. There is another substantial cause back of it. The latter is probably constitutional. Constitutional disease, hereditary conditions are at work. There are also cases in which we have generalized epileptic convulsions due to protracted labor, then there is no doubt of local damage, the head was violently pressed upon, the motor area of both sides is doubtless covered with small minute hemorrhages not sufficient to produce paralysis, but sufficient to produce epileptic convulsion. Epileptic convulsion is the result of irritation of the motor area. To sum up, if a child develops epileptic convulsions generalized in character there may be back of it a constitutional morbid element sufficient to produce irritation of the brain, or small hemorrhages over both motor areas. There are so many elements entering into this problem. A boy of 13 suddenly develops convulsions. After Wassermann is taken and proper treatment instituted the child gets better. On the other hand, we find cases in which disturbed metabolism is likely to bring on convulsive seizure. Where this is corrected the convulsions disappear. So in spite of all I cannot give Dr. Boyd a direct answer, except what I said with regard to so many elements which should always be considered. In his particular case, of course, provisionally it is impossible to give the Doctor a reply as to what age epilepsy developed.

DR. EDWARD A. SCHUMANN read a paper upon **The Economic Aspects of Abortion.**

From 80 to 85 per cent of all cases of induced abortion occur among married women who have had one or more children and were at the time of the abortion living with their husbands. The commonly held view that illegitimately pregnant women are the victims of the abortions is not true in the majority of instances. The reasons for the constantly increasing number of abortions are largely economic ones, the housing situation in cities and so forth, with the tendency to a low moral fiber, so common among the women of today. The remedy for this condition of affairs is difficult to seek. We have at present legal or punitive methods; second, religious proscription of the practice of abortion; third, education along economic or hygienic lines; and fourth, control of conception. None of these remedies has so far proved of any avail, but it is the opinion of the writer that failing other means, control of conception offers probably the greatest prospect for success. This is a difficult problem, one not yet worked out, but it is the absolute duty of the medical profession to boldly face it and attempt to reach some conclusion.

DISCUSSION

DR. RICHARD C. NORRIS.—If we ought to sanction contraception, how large should each individual family be? When shall it be desirable in the individual family to begin contraception? What laws shall be framed that can be enforced? Undoubtedly a great many useless individuals are brought into the world. Some States have passed laws providing for castration of defectives. I agree with Dr. Schumann that abortion is more common among married women than among the single. I think it is just as futile to attempt to interfere with the law of Nature, such as this is, as it is to contravene the law of gravitation. I don't believe it can be done. I do not think any law in the world can justly settle the problem and as each age comes and goes its standards will vary. Under economic stress the family should not be large. When economic stress is less families should and could be large. I think the less we have to do with this subject the better. We cannot decide for future generations. We cannot predetermine what individuals may prevail, but we, as a profession, should abandon the idealism of the advanced contraceptionists and conclude that contraceptive methods are not to be approved at the present time, in any widespread public manner as through the agencies of contraceptive clinics.

DR. JOHN G. CLARK.—In entering upon any discussion relative to the means of reducing to a minimum the criminally induced miscarriages, we encounter many difficulties. Looking backwards into the remotest ages, we find that the means of inducing abortions were known not only among professional classes but also among laymen. Neither legal measures nor the fear of eternal damnation will restrain women from seeking to have a miscarriage produced when they so desire. As Dr. Goodell said, there were two things a woman would go through hell for, first, to have a baby when she was sterile, and secondly, to get rid of a conception when she feared its consequences.

Relative to the use of contraceptive measures, I am in full accord with Dr. Richard Norris' expression. To put knowledge into the hands of laymen which would control birth rate would in my opinion be a very hazardous proceeding, and who is to sit in judgment as controllers? There are innumerable cases coming under our observation in which there is every argument in favor of contraception, for it is a great cruelty to inflict upon some women repeated childbirths, while for others it is homicidal. However, the question constantly comes up, what are contraceptive measures, and how available are they? As I have studied this situation,

I am very sceptical of beneficial results accruing from the propagation of popular knowledge relative to contraceptive measures, for they are all inadequate. In the stratum of life where such measures would be of great value, the criminal, the mentally deficient, and the poverty-stricken classes, they would not be used. Among the more intelligent classes of people, where it is so essential that children should be born, there is apparently sufficient contraceptive knowledge to limit the birth rate. France is practising these measures at her national peril. I cannot help but feel, therefore, that while contraceptive measures may be of idealistic value, in practical use, they will prove harmful.

Sometime ago a representative of this contraceptive movement came to me and endeavored to solicit my interest in the matter. A United States senator, who is a physician, had said that if several representative Philadelphia physicians would sponsor this movement he would be willing to introduce a measure into Congress which would favor such a propaganda. Feeling as I do, I could engender no enthusiasm for it, because I cannot see how it is possible to limit this idealistic doctrine to safe usage. In our slum districts where there is a high degree of fertility, contraceptive measures are not only impracticable, but would not be adopted. For a woman who is pressed upon on all sides by poverty and the most gruelling conditions of life, with a family already too large, further additions are really tragic, and any measure which would limit the birth rate in such instances would, I am sure, be beneficent, but can it be restricted within legitimate bounds? As we all know, it is not long after a malpractitioner enters upon his nefarious career that his reputation rapidly increases through gossip. A woman who has gone through an illegal miscarriage or abortion is not likely to be secretive about the matter when it comes to passing this knowledge on to some sister who is also in trouble. This is particularly true among married women. Just as gossip concerning these criminal matters is passed on from one to another, so instruction relative to contraception would quickly be disseminated not through restricted professional but through irresponsible lay channels. In these days when sex matters are almost topics for dinner conversation, there is not much that the modern boy or girl of seventeen or eighteen years of age does not know. Among the means for inciting curiosity concerning sex matters, moving pictures and salacious books, which escape the censor's eye, are most pernicious. Even if we possessed any assured means of contraception, therefore, which might be addressed to deserving people it would quickly find its way into the hands of those who would desire to avoid the penalties of immoral living. To repeat, therefore, the whole question seems to me to be an exceedingly dangerous one upon which to touch. As to limiting malpractice, there can be to my mind but one means, and that is, through education, laying stress upon its grave physical dangers and the fact that it is a homicidal act. Here again we are immediately met by a well nigh impossible situation, for everyone of us knows that when a woman applies for illegal assistance, moral or religious suasion is seldom a controlling influence, and even the direct forecast regarding physical dangers has no restraining effect. Dr. Schumann has asked the question as to how we are to limit miscarriages? It is an evil which has existed through all time and will continue to exist. It may be held in stricter abeyance by more drastic laws and further minimized by moral training of young people.

DR. EDWARD A. SCHUMANN.—May I remind the members and the Chair that my paper was not in advocacy of contraception? I am asking for a remedy for the increasing number of induced abortions in our hospital wards.

DR. JOHN A. MCGLINN.—I understood from Dr. Schumann's paper that he advocated contraception as one of the cures for the frequency of induced abortion. It seems to me that this is an intensely difficult proposition to settle. There is no

question but what there are more abortions among married women than the unmarried, for the simple reason that there are more married women indulging in sexual intercourse than the unmarried, so I do not think you need be surprised as far as these statistics are concerned. It is rather striking within the past two weeks I have had three patients in my office who in order to avoid children have resorted to induced abortion. One of them had one child five years ago and became pregnant shortly after and had abortion produced and then later the child was killed by an automobile. She has stopped contraceptive measures and endeavored to become pregnant. On examination she has had sealed up tubes. Now she is perfectly willing to undergo an operation to bear a child. The other two women are "crazy" for children. One marriage is going to result in divorce. We should not ask the Legislature for more laws; we have more laws than we need at the present time and will only have another that will not be enforced because you cannot make people good by legislation. It seems to me the solution of this problem is that the individual has to be taught morals and have a conception of the moral law. It is not much good to preach to them. They will take a chance anyhow. About a year ago I presented a report of five cases where a special pessary was introduced in order to prevent conception. All these women were related to each other; one had a hysterectomy done as the result of infection and nearly died; in spite of this her sister had the same thing introduced. She had a pelvic abscess and refused operation. In spite of her experience her cousin had the same thing introduced; she developed infection. In spite of that a personal friend went over and got the same thing, she became pregnant and the pessary slipped up into uterine cavity. You would think in these cases that experience would have taught these women not to adopt such measures.

DR. BROOKE M. ANSPACH.—Undoubtedly in the upper classes of society the birth rate is low. Some years ago in the Babies' Hospital Campaign to raise money for a new building, I was persuaded to join one of the teams. I went to a rich man, solicited a large contribution, and urged the necessity for conserving infant life. He asked me what proportion of the increase in the population of the United States since the Civil War was due to children born of parents native to this country. I went to some trouble to find out and was struck by the small number of children among native born Americans and the much greater number of children among the foreign born. I think that intelligent people should be given to understand that they have a duty to the State to fulfil, that they ought to raise children and that they should only limit their families by the measure of reasonable necessity. Legislation, of course, is out of the question. It would be quite unwise to attract public attention to this subject, nevertheless, I think Dr. Schumann has brought before us a very vital question, and we can profitably discuss it among ourselves. It is for us to give what information we have, to those who are ignorant.

DR. SCHUMANN (in closing).—I confess to some measure of disappointment. I came here with the request for some remedy to prevent the steadily increasing number of criminal abortions. What is the remedy? I have not heard a single constructive word here tonight. What are we going to do about the abortions? They are here. Like manna on parched soil comes Dr. Anspach's statement that really something ought to be done about it and possibly contraception is the remedy. None of us will say, What are we going to do? If the subject is brought up the medical profession invariably says that is a matter unfit for medical discussion and the abortion rate goes up and up in the meantime. I believe the sooner we realize that this is a condition and not a theory and we have got to do something about these abortion cases in married women, the better. I do not offer contraception as the remedy. I offer it as one suggestion.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

ESSENTIALS IN ROENTGENTHERAPY OF INTEREST TO CLINICIANS; WITH A CONSIDERATION OF ITS APPLICATION IN GYNECOLOGY

By M. R. ROBINSON, M.D., F.A.C.S., New York

Adjunct Gynecologist to Beth Israel Hospital, Attending Gynecologist to Beth Moses Hospital

ROENTGENTHERAPY is a composite of the sciences of electricity, physics, mathematics, biology, and biological chemistry. The scientists who labor independently and conjointly in these different fields look to the clinician for guidance and inspiration in the pursuit of their researches. For through the practical application of the theories evolved in the laboratory, the clinician comes into possession of facts which verify or disprove the scientific claims. In order that clinical criticism may be constructive it is necessary that the clinician be versed in the essentials of the sciences bearing upon the remedies he is employing.

The application of x-ray energy as a therapeutic agent is constantly increasing; it has already invaded almost every medical specialty, and no clinician who is abreast of the time can afford to remain indifferent to it. It is my aim to present to the practicing physician the essentials of radiotherapy in a clinically assimilable form, so that he may prescribe or proscribe this remedy in an intelligent and conscientious manner.

I. THE PHYSICAL FACTORS

A. The Source and Character of X-Rays.—X-rays come into being through a transformation of electrical energy from one form into another, under the following physical conditions. When an electric current of high voltage is made to pass a vacuum of about 5 mm. of mercury, the current will flow from the anode or positive pole to the cathode or negative pole. This attempt is accompanied by the appearance of a diffuse red light around the anode, a faint bluish light around the cathode and an intervening dark space. If the vacuum is still further reduced to about 1/100,000 part of the atmospheric pressure, the anode light will recede, the dark space will temporarily increase, and finally the cathode rays will appear.

The cathode rays are invisible to the naked eye, and result from a dissociation of cathode atoms into ions and electrons. The former

are corpuscular elements charged with positive electricity, they remain in the broken up atoms or travel backwards through the cathode, and are known as canal rays; the electrons are supposed to be negatively charged particles of matter, they travel forward with a rapidity corresponding to 100,000 kilometers per second.

When these electrons are hurled forward from the cathode at this tremendous rate of velocity, and are made to impinge upon a solid medium, such as the anticathode in the x-ray tube, a new form of energy is generated through the breaking up of the atoms in the anticathode, which expresses itself in the emission of x-rays.

The x-rays like the cathode rays are invisible to the unaided eye. They travel in a rectilinear direction, at a rate equal to that of light, 300,000 kilometers per second. They are not influenced by magnetic waves, but they can be deflected the same as ordinary light rays, and possess the unique properties of fluorescence and of penetration of solid media.

B. What Becomes of the X-Rays After Having Entered the Tissues?—When a bundle of x-rays, sent forth by the anticathode strikes the surface of the body, a part of these rays is absorbed by the tissues, another part passes through, and still another portion is changed into secondary rays.

The secondary rays consist of three main subgroups which may be briefly described as follows: (a) diffusion or scattered rays, which are merely deflected primary rays, dispersed by all substances, in contradistinction to light rays; (b) fluorescent or characteristic rays, which arise in the tissue atoms, and in addition to being deflected the same as scattered rays, also possess a moderate degree of penetrability, which increases with the atomic weight of the irradiated substance; and (c) the corpuscular or B. rays, which arise in all substances irradiated with x-rays, and whose penetrability depends upon the hardness or softness of the primary rays. The secondary rays have no wave characteristics, are formed of "a stream of electrons," and unlike the characteristic rays, their penetrability is not influenced by the nature of the irradiated substance. According to Dessauer¹ "the carriers of the biological effects are the electrons, of which the corpuscular rays are composed."

C. The Penetrability and Absorption of X-Rays.—Spectroscopic studies have shown that the beam of rays as it emerges from the anticathode, consists of a heterogeneous mass of rays of different wave lengths. For the sake of practical utility these rays have been subdivided arbitrarily, into two main groups, short and long wave rays. The differentiation depends upon the variation in the rate of rapidity with which the electrons composing the rays travel. The electrons of the short waves travel far more rapidly than the electrons in the long waves. With the change in the character of the rays, there also follows a change in their penetrating powers and absorption coefficient. So that long wave rays are soft, penetrate less deeply and are absorbed in greater amount, than the short waves, which are hard, have a higher degree of penetration, and are less absorbable. The factor of absorption is also modified by the atomic weight of the irradiated substance, media of greater atomic weight absorb more rays than those of lighter weight.

Notwithstanding the value of the above information, the number

of x-ray burns kept on increasing as the employment of x-ray therapy kept on extending. The burns are frightful and even worse than the third degree burns resulting from ordinary fire. Among the victims were not only patients, but also some of the pathfinders in roentgenology. In the attending personnel the injuries from the x-rays differed in character, from blood dyscrasias, to sterility, and to the development of malignant skin tumors. Not until the principles of filtration were enunciated for the first time by Perthes² in 1904, have the frightful results that followed in the wake of x-ray therapy begun to diminish in frequency.

D. The Principles and Advantages of Filtration.—Filtration is the process by which most of the soft rays are being eliminated from the ray bundle, through the interposition of a metallic plate of either copper, zinc, or aluminium, of different thicknesses, singly or combined, between the x-rays as near as possible to their point of exit, and the irradiated object.

The advantages of this procedure are: (a) the avoidance of the x-ray burns which are due to an excessive absorption by the skin of soft rays, and which are now absorbed and retained in the filters; and (b) the standardization of the therapeutic agent by obtaining a composition of waves of almost equal length, which also means uniform quality.

E. The Significance of Homogeneous Raying.—In 1905 Dessauer³ formulated the principles of homogeneous raying and upon those principles the entire superstructure of modern roentgentherapy was built up. To obtain a clinical conception of the value and importance of homogeneous raying, let us view this problem in the light in which we pursue the study of the action of drugs in general, and note wherein this electro-magnetic remedy differs.

Drugs are generally subdivided into distinct groups, each of which has a definite and specific effect upon a definite organ or tissue, directly or indirectly through the blood. As a concrete example, digitalis is well known to slow the heart's action and to increase its force. Larger or smaller doses will produce corresponding physiologic effects, and the change in dosage will never alter its properties as a cardiac stimulant. Radioactive energy, on the other hand, changes its specificity with the variations in the amount and the quality administered, so that different doses of x-ray affect different tissues. Besides dosage the effect of roentgen ray energy is also greatly modified by other factors, chief among which are the following: (a) distance between the source of the rays and the irradiated object, which diminishes or increases with the square of the distance; (b) the absorption of the rays by the intervening substances and the tissue, between the organs or tissue we wish to irradiate, and the point of entry; (c) the diffusion and the scattering of the primary rays; (d) the size of the point of entry, large or small fields; (e) the biologic state of the tissue; and (f) the degree of cellular and general immunity enjoyed by the organism at the time it is subjected to the treatment.

Leaving out for the moment the above enumerated factors which influence the therapeutic effect of the rays, and bearing in mind only quantity and quality, we are brought to the consideration of the next important principle in roentgen therapy, namely the equal dis-

tribution of the radioactive energy throughout the irradiated fields. For as Jüngling¹ has stated, "The acknowledged necessary minimal dose must be distributed to the entire danger zone, otherwise the irradiation is valueless."

In radiotherapy, therefore, we have two kinds of homogeneity: (a) qualitative homogeneity, which refers to the rays; and (b) quantitative homogeneity, which means an equal distribution of the remedy to all the parts of the diseased focus. To give these academic facts a clinical interpretation, let us assume that we undertook to treat a case of sarcoma of the uterus. It has been established biologically that the sarcoma dose is 75 per cent of the skin erythema dose. If we proceed to irradiate this organ, without taking sufficient pains to see that each cubic centimeter of diseased tissue receives an equal amount of x-ray energy, the effect will fall short of success. The areas receiving less than the lethal sarcoma dose will be stimulated and the tumor cells will proliferate, while those receiving an overdose will show necrosis, not only of the tumor cells alone, but also of the healthy surrounding tissue, and thus further diminish the natural resistance of the organism against the invasion of the neoplasm. Equal distribution of the proper x-ray dose is hence of vital importance, particularly in the treatment of malignant growths.

F. X-Ray Dosage.—The unit of x-ray dosage is a biologic estimation, obtained in the following manner: When a certain amount and quality of x-ray energy is allowed to irradiate a normal skin surface for a definite period of time, and if the skin surface will show a pinkish red reaction after an interval of eight days, and at the end of four weeks a dark brown discoloration, then it is assumed that a biologic dose has been given. This amount is calculated as 100 per cent, or as the maximum of skin tolerance, and is termed "the skin erythema dose." Smaller doses will fail to call forth the above described skin reaction, and excessive amounts will be followed by blistering, and later on by necrosis of the irradiated area.

Guided by these morphobiologic phenomena, biologists and clinicians have tested out the reaction of various tissues to the effects of x-rays, and have adopted an arbitrary scale of x-ray dosage. An x-ray dose may hence be defined as a fraction, the whole or multiple of the skin erythema dose, depending upon what we seek to accomplish, stimulation, inhibition, or destruction of the irradiated cells.

We cannot dismiss the subject of this phase of x-ray therapy attention to the fact that our knowledge of this phase of x-ray therapy is not absolute, for what we have accomplished thus far with photochemistry, ionization, electroscopy and the other electrophysical aids, was to measure the x-ray energy delivered by the electric apparatus, transfer this energy to the tissues, watch its effects upon and in the tissue, and then only draw biologic inferences.

II. THE BIOLOGIC FACTORS

In the preceding section I have dwelt upon those factors in roentgentherapy which have definiteness and stability, and which may be modified at will to suit our purposes. I shall now consider a group of factors which are indefinite and labile, and which can be influenced to a limited extent only, through indirect means. From the above stated premises it must be concluded that as long as one of the fac-

tors in the roentgentherapeutic equation will, by virtue of its nature, always contain some elements of uncertainty, so long will its solution remain incomplete. We may, however, expect that through a more inclusive understanding of the biologic processes which influence and modify the radiosensitiveness of tissue, and through a better mastery of the means for a more equal and more extensive distribution of the radioactive energy through the tissues, we shall approach a state in roentgentherapy, that will border as closely as it is possible in biology, on the lines of the exact physical sciences.

A. What Takes Place in the Irradiated Tissues?—As interest centers chiefly upon the problem of cancer therapy I shall limit my consideration to the morphologic changes which ensue in the tumor and in its surrounding tissues as a result of irradiation. Aschoff and Woegten⁵ have described these structural changes as follows: "There is at first a swelling of the cell, then hyperchromatosis, followed by a gigantic growth of the nuclei, vacuolization of the protoplasm and partly also of the nuclear substance. Necrosis and degeneration then set in, and the destroyed and dead tumor cells coalesce into an amorphous mass, which lies as a foreign body in the stroma of the original tissue. This foreign mass of cells calls forth an irritation in the surrounding connective tissue through its liberated toxins; the latter proliferates, replaces the necrotic mass and a scar is formed."

Perthes⁶ recorded his observations thus: "The destruction of the cancer bearing area is accompanied by an excessive infiltration of round and connective tissue cells, which force their way in between the epithelial cells, break up the regular and well circumscribed cancer plugs into irregular cancer nests, which are now lying in a network of connective tissue. In the stroma there is an abundance of round cells, among which cancer cells are scattered. The tinctorial properties of the epithelial cells are retained by some, while most of the nuclei are poorly stained. The protoplasm appears as a uniform confluent mass, containing many vacuoles. Most of these spaces are filled with round cells whose nuclei stain well."

Further biologic studies have also brought to light the following salient facts: (a) The effect of the radioactive energy in the tissue does not appear immediately, but after an interval of time, termed "the latent period"; (b) radium or roentgen rays possess no exclusive predilection for tumor cells, they affect all tissues, only in varied degrees, depending upon the dose administered and the biologic state of the tissue; (c) the tissue response, particularly in the surrounding healthy structures, is due not alone to the irritative effects of the toxins liberated by the breaking down neoplasm, but also to the stimulating effects of the rays; and (d) that lymphocytosis and leucocytosis are outstanding morphologic phases in the cancer-bearing tissue examined after irradiation. The clinical value of these facts is important. Because of our knowledge of the "period of latency," we no longer delude ourselves by the absence of an immediate skin burn as an indicator of proper dosage, for it is known that the damaging effects of the rays may appear as late as six months or even later after irradiation. The fact that the rays act upon all tissues should make our object in radiotherapy not only the destruction of the cancer cells, but also the stimulation of the surrounding healthy tissues. The increased regional as well as general lymphocytosis ob-

served in tissues under roentgen treatment brings to our minds the phenomena of inflammation with all its pathologic features and physiologic processes.

Teilhaver⁷ was the first to view the problem of cancer from an inflammatory point of view, in the sense that it is the cancer which calls forth the inflammation and not *vice versa*. In his latest contribution he restated his teachings of 1909 and 1914 with still greater clarity and conviction. At the periphery of every cancer-bearing area there is present a distinct zone of lymphocytic infiltration, irrespective of whether the tissue has been irradiated or not. Spontaneous cures of cancer have been reported from time to time by trustworthy authorities. Round-celled infiltration and spontaneous cure place the cancerous invasion in the category of a bacterial infection, in which the leucocytes play the all important rôle of defense and cure. The rôle which these immunity builders and carriers play in the therapy of cancer is in no way inferior. In cancer, instead of microorganism, we have the epithelial cells which try to invade and destroy the connective tissue, and thus bring about the death of the organism. Against this invasion the lymphocytes stand guard, and as long as they can muster sufficient numbers, far in excess of the epithelial cells, so long will the latter be confined to their limitations, and the cancer will fail in its attempt. On the other hand, should the natural forces supported by artificial aids not suffice to call out sufficient reserves, then the neoplasm breaks through the lines of defense, and lays waste to every tissue and organ that lies in the way of its advance. "The lymphocyte thus acts not only as a policeman in the cellular domain of the human economy, but also as an apothecary. He stands guard, prepares the remedy, the immune bodies, and carries it to the most needed places. This explains the enlargement of the lymph glands and the spleen in most of the infectious diseases. It is Nature's attempt to increase the body's immunity through an enlargement of the organs whose function it is to elaborate antitoxins, antibodies, etc. As a negative proof, we may cite the fact that the reason for the increased predisposition to cancer and other diseases in advancing years, is the gradual involution of the lymphopoietic organs."

B. The Radio Sensitiveness of Tissues.—The reaction which takes place in the cells of an irradiated tissue has been termed "radio sensitiveness." Based upon numerous and painstaking morphologic observation, clinicians, pathologists and biologists have finally arrived at conclusions which made possible the formulation of the following laws:

1. The Arndt-Schulz law:—(a) small doses of radio energy stimulate the cells to reproduction and growth; (b) larger doses inhibit their function and stop growth; and (c) very large doses cause their death, through a destruction of their nuclei, and dissolution of the protoplasm into an amorphous stainless mass.

2. The Bergonie-Tribondeau law:—cells whose differentiation as to structure and function has not yet reached definiteness, are far more sensitive to the effect of x-ray than the more mature cells.

These laws form the basic principles upon which rests all the biologic research accomplished up to the present, in its relation to radiotherapy. As clinical guides they serve fairly well in most instances,

but they are not absolutely accurate and dependable. As an illustration I may cite the oft recorded observations by biologists and clinicians, that morphologically identical tissues react differently at different times, to the same x-ray dose. What is at the bottom of these inconsistencies?

Not being in possession of means with which to observe the biologic changes that take place in the tissue cells and their environment during irradiation, investigators had to content themselves with the more attainable facts, the morphologic appearance of the tissue after treatment. But biologic studies do not permit of final conclusion drawn from end-results alone; such deductions no more represent the actual process of the biologic change than do postmortem findings interpret truly physiologic pathology.

Radiosensitiveness is a biologic state, and as such changes from moment to moment, like life itself, which Sterling⁸ defined as "a continuous series of reaction to environment, ending only in death." In determining, therefore, the radiosensitiveness of a tissue, we must take into consideration not only the morphologic change, but also the biologic condition under which this change was brought about. Only then, when we will be in a position to record and reproduce equal biologic states at will, with the same readiness as we are able to reproduce the physical factors in radiotherapy; only then may we hope to reproduce a uniform reaction of similarly constructed tissue, when exposed to the same dose of radiotherapy.

As a striking example of the influence of environment, nutrition and trauma upon the radiosensitiveness of tissue are the experiments of Voltz.⁹ He has shown that—(a) plants raised upon solutions containing different amounts of iron will react differently to the effects of radiation, those containing more iron will be more sensitive than those containing a lesser percentage; (b) plants raised in hot houses, or under exposure to intense artificial light, will be more sensitive to rays, than plants growing under normal conditions; (c) plants through whose soil a galvanic current was passed repeatedly, became more susceptible to radio energy than the control specimens. Later on we shall see how these experiments are clinically verified.

C. The Rôle of the Blood in Radiotherapy.—Whether the success in deep radiotherapy depends upon the direct destruction of the tumor cells, or upon a transformation of the physical into chemical energy which ultimately destroys the cancer cells, or as Krönig and Friedrich¹⁰ claim, that the x-ray dose for carcinoma weakens the tumor cells, thus giving the surrounding healthy tissue an opportunity to gain the upper hand, the fact remains that before any of these changes can take place within the cell, the radiant energy must first enter into a biochemical union with it and be absorbed.

Before the technic of deep roentgentherapy reached its present state of efficiency, roentgentherapists met with many difficulties, in bringing sufficient amounts of radio energy into the tissue depths, without injuring the overlying skin surface or the intervening vital organs. They have hence resorted to the intravenous administrations of metallic salts, hoping thereby to bring about a greater absorption of the x-ray energy, due to the greater atomic weight of these metals. This experiment did not stand clinical test; it proved in many cases to be dangerous and was abandoned.

Attention was then turned to the blood, as the safest and most reliable medium for the absorption and transportation of radioactive energy. The soundness of this theory was soon proved by many investigators. Opitz¹¹ showed that "blood taken from irradiated animals and injected into nonirradiated will produce in the latter's blood changes similar to those observed in the former." To prove that this phenomenon was not due to a foreign protein reaction, he injected normal blood from one animal into another of the same species, without evoking any blood alterations. The same investigator also showed that it requires less radiant energy to effect cellular changes in a neoplasm, when a considerable surface area surrounding the tumor is included in the exposure, than when the tumor alone is radiated. Still more striking is the experiment with isolated tumor tissue, which showed, that an amount of radiant energy equivalent to ten times the dose necessary to sensitize human cancer *in vivo*, will not effect it. All of these experiments demonstrate the supreme value of the blood as the absorber and distributor of radiant energy. In the light of this knowledge, enthusiastic therapists, exposed the whole body to irradiation in the treatment of cancer, so as to obtain the maximum of the curative principle; but this method, too, proved to be impractical and detrimental, for in the anxiety to destroy the tumor a large part of normal tissue, the hematopoietic centers, the adrenals and other vital organs, were also injured beyond the limits of safety.

Pickard¹² has recently published a very unique experiment, which he calls "the extracorporeal irradiation of the blood." It consists of the establishment of an autotransfusion, by which the blood from the radial artery flows into the basilic vein, through a large arched glass tube. The tube is the only part exposed to the x-rays. The outstanding features in this experiment are: (a) the utilization of the hemoglobin in the circulating blood, as the medium for the absorption of the roentgen energy, on account of its atomic weight which is twenty-six times higher than that of any other constituent in the animal economy; (b) the sparing of the rest of the body from unnecessary and perhaps harmful exposures; and (c) the possibility of transmitting the x-ray energy not only to the main pathologic focus, but also to the distant metastasis.

The problem of metastasis very often baffles the logic of the pathologist, the acumen of the clinician and the skill of the surgeon. Quensel¹³ reported a series of fifty autopsies on cancer patients, in six of which he found cancer cells in the blood taken from the heart chambers. This clarifies to a great extent the apparent freakish pranks played by malignant tumors, with respect to the dissemination of their secondary foci, and brings us nearer to the explanation of our therapeutic failures, after apparently successful local cures. Guided by this information, and numerous other studies made of late, the localistic conception of malignant disease must be greatly modified, and cancer must henceforth be considered as a general disease, requiring remedies whose influence and effect shall extend far beyond the regional limitations of the primary tumor.

The two principal roentgentherapeutic methods in vogue at present are the large field and the small field exposures. The former method has of late gained in favor, and promises to remain the method of choice. The main reasons advanced for the preference of the large

field irradiation may be briefly summarized as follows: (a) a gain in the quantity of x-ray energy through the additional summation of the secondary rays; (b) a more extensive inclusion of the regional metastasis; (c) a diminution of the risks of stimulation of some parts of the tumor, due to insufficient dosage; (d) a minimizing of the danger of deep burns as a result of cross firing; (e) the assurance of a more uniform and homogeneous distribution of the roentgen ray energy. Significant, as each of these advantages are, the sum total of their benefit depends upon this vital fact, that in the large field procedure larger quantities of circulating blood are being irradiated. In addition to the great absorbing qualifications, and distributing properties of the blood, it also plays the great rôle as carrier of the lymphocytes, which constitute the line of defense against the malignant invasion.

The mobilization of the lymphocytes, in the treatment of cancer, is occupying the attention of radiotherapists for some time. Injections of blood into tumor, before irradiation, are advocated and practiced by Bier; others inject protein substances hypodermatically or intravenously; some resort to preliminary diathermic treatment; and still others advocate provocative irradiation of the tumor, or stimulating irradiation of lymphopoietic organs or those glands of internal secretion which raise the body tone. It matters little which method we choose in order to raise the lymphocytic index, as long as the net result will be an increased general and local hyperemia and the more successful we are in bringing about this condition, the better will the therapeutic effect of the x-rays be.

As negative evidence of the value of the blood in the prevention and cure of cancer, we may quote the following observations. Schwarz¹⁴ noted that anemic skin can withstand larger doses of x-ray than normal skin, and far more than an hyperemic or an inflamed surface. This means that an anemic tissue or person is less sensitive to radioactive energy, and requires larger doses to bring about a normal reaction, or if the normal dose is employed, the reaction may be very slight or none at all. Teilhaber's¹⁵ pathologic findings of stenosed and obliterated blood vessels in the immediate vicinity of cancerous organs, even in those normally well supplied with blood, as the penis or the uterus, lend further proof, that anemia favors the development and the propagation of cancer. Other examples of anemia as a predisposing cause of cancer are the *ulcus callosum ventriculi*, or the recurrence of cancer at the site of resection. The relation of general anemia to cancer is seen in cachectic patients, who respond very poorly to radiotherapy. Blumenthal¹⁶ epitomized the reason for this fact in the statement that "the defensive reactions in these patients no longer come into play." Grudzent¹⁷ quotes Exner, who wrote in 1907, that "radium therapy had very little or no effect upon cachectic patients." It is therefore a grave clinical error to subject cachectic patients to radiotherapy, for in so doing we are only hastening their end.

D. The Untoward Effects of X-Ray Therapy.—With very few and rare exceptions, every individual, even when in perfect health, will manifest a symptom complex, of greater or lesser severity, characterized by headache, anorexia, vomiting, diarrhea, and at times also by a rise in temperature after exposure to x-rays. For want of a better term, this temporary, never fatal, but at times severe reaction, was

termed "roentgen sickness." The German term "roentgen kater" is, I believe, more expressive. It usually sets in from three to eight hours after irradiation, and lasts from two to three days, when it begins to subside gradually. Roentgen therapists and fluoroscopists insufficiently protected from the x-ray effects also experience from time to time a feeling of exhaustion, which is out of proportion to the energy spent. Were it not for the fact that this reaction to x-ray exposure calls forth in some patients so marked a disturbance that they refuse to submit to subsequent exposures, or that they prolong the intervals far beyond the biologic limitation, and so thwart our therapeutic endeavors, investigators would not have spent so much energy and labor to solve this problem and find ways and means of eliminating roentgen sickness from our therapeutic procedure, or at least to ameliorate its effects.

In the early part of the x-ray era it was thought by many that the annoying and unpleasant symptoms of x-ray sickness were mainly due to the inhalations of the nitrous gases generated in the treatment rooms. This theory does no longer prevail, for the modern x-ray laboratories are so constructed that the ozone and the potassium nitrate odors are entirely eliminated; and yet roentgen sickness continues to manifest itself, perhaps in a slightly milder form. The next theory which appears very plausible and has found many adherents was the one of toxicosis, resulting from absorption of the necrotic elements of the broken down tumor cells. But this likewise met with much opposition, for clinicians have observed that very short exposures and skin irradiations, such as are employed by dermatologists, in which no necrosis took place, were also followed by x-ray malaise.

Another group of investigators have studied the differences between the reactions following the exposures of different body regions and came to the conclusion that irradiation of the gastrointestinal tract gives the strongest reaction. Von Bauer¹⁸ claimed that the x-rays produce a necrosis of the mucosa of the digestive and absorptive apparatuses and the toxins resulting from this tissue degeneration are responsible for the x-ray intoxications. Many roentgen therapists voiced this opinion, but subsequent investigations showed that cases suffering from x-ray sickness fail to show pathologic changes in the gastrointestinal mucosa. It was noted, moreover, that irradiations from which the stomach and the intestines were excluded were also followed by a systemic reaction.

Halberstaedter and Simon¹⁹ supported the theory of von Bauer, in the sense that irradiations of the gastrointestinal tract give rise to a far more marked reaction than those of any other region of the body, but that this reaction is not due to a destruction of the mucosa, but rather to an irritation of the nerve plexuses supplying these organs. As corroborative evidence they point to the fact that in deep x-ray therapy, where large doses of electrical energy are employed to effect a necrosis of the tumor cells, the nervous tissue becomes strongly irritated but does not show subsequent degeneration. Their investigations led to the following conclusions: (a) even small doses of x-rays, in comparison with those required to produce a degeneration, are capable of calling forth a strong irritation in the living cells and that the degree of irritation is an inverse proportion

to the radiosensitiveness of the cell; (b) the duration and intensity of the reaction runs parallel to the x-ray dose, and the manifestations of the symptoms are hastened with increasing dosage.

Clinically it has been observed that individuals of a very labile nervous system are more sensitive to x-ray irritation than those of a more stable constitution, and Simon²⁰ has therefore recommended the administration of sedatives to the highly nervous before the treatment, or what is still more ideal and preferable, a preliminary supportive course of treatment of the nervous system. Keinbrock, Bergonie, and Speder, have defined roentgen sickness as "an early expression of the prodromata in the process of cell degeneration." Werner has advanced the cholin hypothesis as a cause of roentgen sickness, but as its presence after irradiation could not be proved experimentally this theory was discarded. Czepa and Hogler²¹ as well as Strauss²² have ascribed roentgen malaise to an excess of cholesterol in the serum, particularly when the liver is included in the irradiated field. In such exposures the Kupfer cells are injured and are prevented from performing their normal function, of storing cholesterol. The source of the cholesterol is in the nervous tissue which is being acted upon by the soluble lipoids.

Out of this mass of hypothetic and theoretic pabulum offered in explanation of the genesis of x-ray sickness, the theory of "nervous irritation," particularly of the vegetative system, appears to be most plausible, and it finds its fullest elucidation in the recent biochemical studies of kalium and calcium metabolism. Strauss²² has called attention to the fact that during irradiation the body fluids, particularly the serum, change their electrolytic properties, followed by an increased dissociation of the calcium ions. This produces a sympathicotonia, or what is equivalent to a diminished vagotonia. Zondek²³ has taught us that vagus stimulation leads to a change in the subdivision of the electrolytes, in this sense, that in the cell and in the cell membrane there takes place a relative increase of kalium salts; sympathetic stimulation will result in a relative increase of the calcium salts. It is not pertinent to our present consideration to delve into hair splitting refinements, and establish whether the irritation of the vegetative system changes the kalium and calcium equilibrium, or *vice versa*, but we do know at present that proper body functions depend upon a proper balance between the kalium and natrium salts on the one hand, and the calcium salts on the other. Kraus²⁴ states "kalium and calcium constitute the two poles between which life and cell function oscillate to and fro," and in another study he²⁵ emphasizes it, by saying that "kalium and calcium mark time in the direction of our vital forces."

Viewing the problem of x-ray sickness from this angle, the nervous irritation theory can be fully accepted, for under such conditions the vegetative nervous system experiences a disturbance of function without undergoing a permanent physical or chemical change. The clinical course of the malady coincides with this theoretical conception. There still remains one more fact requiring explanation, and that is the difference in the degree of roentgen sickness in irradiating different body regions. This explanation may be found in the realm of endocrinology. The dominance of the ductless glands over the autonomic nervous system, through their control of the kalium and calcium metabolism is now a well established fact. It is no wonder

then that with irradiations in which the ovary, the thyroid, the adrenal, the pituitary or any of the other important internal secretory glands, come within the compass of the x-rays, that a more marked reaction should follow such an exposure, than after one in which they are spared or excluded. Hirsch's observation²⁶ that stimulating doses of the pituitary, ameliorate the roentgen sickness, in subsequent castration exposures, serves as an illuminating example of the soundness of the theory of the relation of the endocrines to roentgen sickness. Encouraged by these experiences Hirsch adopted organo-therapy, in the form of a substitution or supportive treatment, whenever he expects one or more of the endocrines to be damaged or seriously affected by the x-rays in the course of the treatment; his clinical results have verified the rationale of his claim, and deserve trial.

(To be continued.)

Selected Abstracts

Newer Diagnostic Methods in Obstetrics and Gynecology

Roubitschek, R.: The Renal Glycosuria of Pregnancy as an Early Symptom of the Gravid State. *Klinische Wochenschrift*, 1922, i, 220.

Frank and Nothmann as the first showed that the administration of 100 gm. of glucose on the fasting stomach of women in the third month of pregnancy caused a glycosuria without a perceptible increase in the blood sugar values. In the non-pregnant state the blood sugar must reach at least 0.19 to 0.2 per cent in order for sugar to appear in the urine, while in pregnancy glycosuria is obtained with blood sugar values which are normal or only slightly above this point. Thus the estimation of the blood sugar is indispensable in the performance of the test. However, the test possesses several disadvantages, such as the high price of glucose, the nausea and vomiting of early pregnancy, and the necessity for the ingestion at one time of a rather large amount of sweetened liquid. Hence, Frank, Brinnitzer and others have suggested the utilization of the sugar mobilizing power of suprarenin as a test of pregnancy, as it has been found by several observers (including the author) that sugar excretion very rarely follows the hypodermatic administration of 1 c.c. of a 1/1000 solution of suprarenin to the nonpregnant, while in pregnancy this procedure causes marked glycosuria. This suprarenin test is superior to the employment of phloridzin, which causes glycosuria in the nonpregnant as well. Ryser in particular has noted this characteristic action of suprarenin in late pregnancy (with blood sugar values slightly increased), while Brinnitzer has shown the same to be true for the early months. Hence, there must exist an increased permeability of the kidneys to sugar in pregnancy.

Roubitschek tried, in sixteen cases, a combination of the two methods which he found thoroughly satisfactory. In only one case of pregnancy was glycosuria not produced. The test is performed as follows: 200 c.c. of tea with 10 gm. of glucose are administered on a fasting stomach. Twenty minutes later 0.5 c.c. of a 1/1000 solution of suprarenin is injected hypodermatically. As soon as sugar appears in the urine, usually in about three-quarters of an hour, 10 c.c. of blood are taken from the median vein, and the blood sugar is estimated by the Möckel-Frank method. He found that, with glycosuria produced, the blood sugar averaged

0.15 per cent, showing that the glycosuria is of renal origin. In two cases the blood sugar values were on the borderline, but both were found also after pregnancy to excrete considerable amounts of sugar. Another patient, an epileptic, evidently had a tendency to pathologic hyperglycemia, but a blood sugar of 0.215 per cent cannot account for a urine sugar of 4.4 per cent, without there being an increased permeability of the kidney in addition. The author recommends his modification as a simple and valuable test, useful in establishing the diagnosis in early pregnancy or in doubtful cases.

E. L. KING.

Köster: Phloridzin in the Diagnosis of Pregnancy. Deutsche Medizinische Wochenschrift, 1923, xlix, 182.

Phloridzin, when injected intramuscularly, produces a glycosuria irrespective of the amount of blood sugar present. In testing kidney function, one decigram is injected. Since during pregnancy there is a heightened irritability of the kidneys, Kamnitzer and Joseph obtained a glycosuria in pregnant women by injecting only two milligrams. Of 300 cases, they had only 6 negative results, or 2 per cent. Köster was not able to corroborate their findings.

The Kamnitzer-Joseph method was employed. Immediately before the test the patient voided. Every half, and in some cases every quarter hour, after the injection, the urine was examined with Nylander's reagent. In order to produce diuresis, she was given 200 c.c. of unsweetened tea at the time of the injection and again half an hour later.

In intrauterine pregnancy at all months of gestation, he had 36.3 per cent failures. In 8 cases of undoubted ectopic pregnancy, there were 62.5 per cent failures. In 18 cases of abortion, there was only one failure, while in 14 cases of incomplete abortion, there were 6 failures. Of 20 cases of suspected ectopic pregnancy, three were positive, but in no case was any evidence of pregnancy found at operation. Frequently the results varied from day to day.

From the results obtained, Köster concludes that the phloridzin test of pregnancy is as unreliable as all other tests heretofore introduced.

R. E. WOBUS.

Schilling, E., and Gobel, M.: The Diagnosis of Pregnancy by the Injection of Phloridzin. Klinische Wochenschrift, 1922, i, 899.

The authors tried the test of pregnancy devised by Frank and Nothmann. They found it reliable in the few cases in which they used it, though Seitz and Jess obtained a positive reaction only in about 50 per cent of their cases. In view of this suspicion of unreliability, together with other objections to the test, the authors have discarded it. They have not tried the suprarenin test, nor Roubitschek's combined method, but have followed Kamnitzer's lead in employing phloridzin, which was used in 100 cases.

An occasional rise in blood sugar was found, but no direct relationship between the blood sugar values and the outcome of the test was established. This was not surprising, as phloridzin increases the permeability of the kidneys to sugar, so that we are not dealing with a simple filtration, but with a true secretory action.

The results were as follows:

(1) In 10 cases of pregnancy, the test was positive; (2) In 70 nonpregnant cases, convalescents from various diseases, the test was negative. Some were tested before and during the menses, but no change in the result was noted; (3) In 11 cases with high fever, a positive result, using all three tests for urinary sugar, was obtained in seven. Hence this method is not applicable to febrile patients; (4) In 3 cases the Nylander reaction was positive, while the Trommer and the Heine tests were negative. It is therefore recommended that, when the first test is positive, it be checked by the employment of the other two.

E. L. KING.

Küstner: The Diagnostic Value of Adrenalin Glycosuria in Pregnancy. *Deutsche Medizinische Wochenschrift*, 1922, xlviii, 1340.

Instead of giving the patient 100 gm. of glucose and examining the urine for sugar, Küstner gives 10 gm. dissolved in 200 c.c. of water and follows this in from 15 to 20 minutes with a hypodermic injection of 0.5 mg. of adrenalin. Thirty minutes, and again an hour later, he examines the blood for sugar. If, by this time, sugar does not appear in the urine, the blood is again examined half an hour later.

The sugar usually makes its appearance in the urine in from three-quarters to one and a half hours. The average maximum blood sugar is 0.141 per cent. He examined 125 women, pregnant from 32 days to 7 months, and found a renal diabetes in 97 per cent of the women examined. R. E. WOBUS.

Rommert: Glycosuria of Pregnancy. *Deutsche Medizinische Wochenschrift*, 1923, xlix, 912.

It has long been known that the tolerance for sugar is lessened during pregnancy. The author tested a series of cases by the Brinnitzer-Roubitscheks method, giving 10 grams of dextrose and 0.5 milligram of adrenalin. The adrenalin seemed to cause palpitation and restlessness in some cases. Results obtained by giving 100 grams of dextrose in 400 c.c. of tea without adrenalin also seemed of value. As the glycosuria lessens in three days after the placenta becomes detached it seems probable that this is a typical disturbance due to pregnancy. Küstner, on the ground of animal experiments, felt that the function of the ovary was concerned in the reaction; other authorities, the hypophyseal secretion. The best that can be said is that the glycosuria of pregnancy is a disturbance of the internal secretory gland system.

The author believes that glycosuria can be caused by this method; without substantial raising of the blood sugar (not over 0.21) but with such individual fluctuations to consider that often it does not follow whether the test is strong or weak. He cannot place much dependence on it as a test of pregnancy.

F. A. PEMBERTON.

Küstner, H.: Renal Diabetes During Pregnancy and Its Dependence Upon the Glands of Internal Secretion. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1923, lxii, 119.

The author studied 125 pregnant women to determine the presence of renal diabetes in them. He found that in the early months of pregnancy, renal diabetes was always present. When a pregnancy was terminated during the first few months, the excretion of sugar did not cease until 72 hours later. As a control, nonpregnant women were studied and the author found that 20 out of 22 nonpregnant women showed, in the presence of a physiologic hyperglycemia, an excretion of sugar in the urine a few days before the menses began. On this last finding the author bases the conclusion that renal diabetes in pregnancy is not the result of the products of pregnancy but is due to a change in the function of the glands of internal secretion. Since this diabetes is present both during pregnancy and during the premenstrual period, it is due to a change in function of the ovaries. This the author claims to have proved experimentally in animals.

After removal of the pregnant uterus, the renal diabetes does not cease until after four to five days. When the ovaries are extirpated, the glycosuria disappears the day after the operation. The ovaries most likely affect the kidneys indirectly through stimulation or inhibition of other glands of internal secretion. Implantation of ovaries from pregnant to nonpregnant animals produced a renal diabetes

after two to four days. This proved that an increased activity of the ovary was responsible for the renal diabetes.

Injections of ovarian extract and corpus luteum extracts were made and it was found that only the latter produced a real renal diabetes. Hence it appears that the corpus luteum plays the dominant rôle.

J. P. GREENHILL.

Long and Hirst: Ingestion Glycosuria, an Aid to Early Diagnosis of Pregnancy. *New York Medical Journal*, 1923, cxvii, 543.

This series of 55 observations brings added evidence to strengthen the assumption that an ingestion glycosuria can be induced in the early months of pregnancy; that it is a valuable diagnostic acid, and that the glycosuria disappears when the fetal and maternal parts are no longer in physiologic relationship. The literature shows a 95 per cent accuracy with the glucose ingestion diagnostic technic in the first three months of pregnancy.

The use of table sugar instead of glucose, and qualitative instead of quantitative tests for sugar in the urine, do not affect the results but make the test more practicable. It is necessary to determine blood sugar only in positive cases to eliminate values over 200 mg. to 100 c.c. of blood. Lactation seems to have no effect on the appearance of glucose in the urine during the test.

The phloridzin technic has yielded no satisfactory results.

MARGARET SCHULZE.

Vignes: The Sedimentation of Red Blood Cells in Pregnant Women. *Le Progrès Médical*, January 27, 1923, p. 37.

Fahraeus has been able to demonstrate both in vivo and in vitro that the red blood cells possess the property of more rapid sedimentation in pregnant women than in the nonpregnant state. He proves this by isolation of a small segment of vein which is tied at both ends. If then the vein be held in a horizontal position for fifteen minutes and a hypodermic needle introduced at the upper extremity of the portion of vein isolated, one will be able to draw off only clear serum. The foregoing holds true only for a gravida and not for a nonpregnant woman.

Further study, by Vignes, has shown that the rapidity of sedimentation varies directly with the duration of the pregnancy. He also found that this same property was present in such pathologic states as tumor formations, acute infections, etc.

That this increased rapidity of sedimentation was due to a property of the blood plasma and not of the red blood cells was shown by experiments in vitro where washed cells showed the normal rate of sedimentation in physiologic saline, while seemingly normal cells showed an increased rate when introduced into the plasma obtained from a pregnant woman. Vignes attributes this to either a diminished viscosity of the plasma or to a changed surface tension, or most probably, to the diminished specific gravity of the plasma, finding that the rate of sedimentation varies inversely with the specific gravity of the plasma.

THEODORE W. ADAMS.

Molnar: Diagnostic Value of Sedimentation Time of the Red Corpuscles in Gynecology. *Zentralblatt für Gynäkologie*, 1923, xlvii, 845.

The writer confirms Linzenmeier's postulates that (1) a sedimentation time, less than thirty minutes, is evidence of acute inflammatory process except in severe intraabdominal bleeding; and (2) that less than an hour may indicate the presence of virulent organisms, while over two hours suggests the absence of even latent infection.

He believes the test to have value (1) in the differentiation of inflammatory and noninflammatory tumors of the adnexa; (2) in fixing the time of operation in inflammatory conditions and altered positions of the uterus with complications; (3) as an indication of possible adnexal disease when curettage is indicated; (4) in differentiating between salpingitis and extruterine pregnancy taking into consideration the symptoms; and (5) in general, in gynecologic conditions of inflammatory origin.

LITTLE.

Stein and Arens: Roentgenograms of the Fetal Skeleton as a Positive Sign of Pregnancy. *Journal American Medical Association*, 1923, lxxxi, 4.

Stein and Arens make use of roentgenograms to confirm the existence of a pregnancy, to diagnose presentation, and to differentiate pregnancy from other abdominal enlargements. Four hundred cases were used for their examinations and in only three cases were they able to diagnose pregnancy before quickening. They speak very highly of the method as a diagnostic means in the last trimester.

W. KERWIN.

Roberts: Oxygen Inflation of the Peritoneal Cavity for Radiographic Purposes. *British Medical Journal*, 1920, No. 3124, p. 742.

The method of the author is to prepare the patient with the use of castor oil and restriction of solid food. The oxygen is injected with a fine needle introduced about one inch below and to the left of the umbilicus. In an ordinary adult, not over three or four liters are introduced. After the examination is completed, the needle is reintroduced and the gas allowed to escape. If the gas is not removed, absorption takes five or six days as a rule. He thinks the dangers are largely theoretical, having had no evil consequences in fifty cases. Most of the discomfort is obviated by the removal of the gas at the end of the examination. Various postures are used for different sorts of examinations. He states that the female pelvic organs are visible but that it is difficult to distinguish a solid ovarian tumor from a uterine fibroid.

F. L. ADAIR.

Coliez, Robert: The Artificial Pneumoperitoneum in Gynecology. *Gynécologie et Obstétrique*, 1921, iv, 562.

The author gives a brief review of the literature. He mentions four positions which have been advised in this method of examination: (1) knee chest position with the tube under the table, the rays directed vertically; (2) vertical Trendelenburg position with the rays directed perpendicularly toward the table; (3) lateral Trendelenburg position with the rays directed horizontally, either dorsal-ventral, or ventral-dorsal; (4) simple dorsal Trendelenburg position with the rays directed laterally. The author considers this method of great value, without any special danger if properly carried out.

F. L. ADAIR.

Peterson-Cron: Transuterine Gas Inflation. *Journal American Medical Association*, 1923, lxxxi, 980.

The Rubin technic with slight modifications was used to determine the patency of the fallopian tubes and with the aid of pneumoperitoneum roentgenographs made for the purpose of diagnosis. They used carbon dioxide under a maximum pressure of 200 mm. of mercury, but expressed the belief that a higher pressure can be used with safety. In 36 cases of sterility, 13 conceived after the use of gas inflation, and 10 resulted in full term pregnancies, while 3 had spontaneous abortions. They divide the question of sterility into groups, the younger group of women offering

a greater chance of conceiving. They observed during operation rupture of the infundibulum about one inch from the fimbriated end under a gas pressure of from 250 to 350 mm. of mercury. The criteria on which the patency of the tubes is based are four: (1) a manometer reading below 200 mm. of mercury; (2) the sound of the gas passing through the tubes, detected by auscultation over the symphysis; (3) pain in the upper abdomen when the patient is in the sitting posture; and (4) roentgenography or fluoroscopy. About 50 per cent of the women who complain of menstrual cramps are relieved after the inflation. It is now the method of treatment for dysmenorrhea at their clinic and in several hundred cases of transuterine gas inflation, there have been no ill effects. In two cases of early pregnancy, undiagnosed, gas was passed without causing abortion or any injury to the fetus.

WM. KERWIN.

Impey: Pneumoperitoneum of the Pelvis as an Aid to Gynecologic Diagnosis.
Edinburg Medical Journal, 1922, xxviii, 21.

The author from personal observation reports in detail the work being done at Ann Arbor by Peterson and VanZwaluwenburg on pneumoperitoneum as a diagnostic aid in gynecology. Through this method the organs of gynecologic interest are outlined by the contiguous gas and all extraneous structures, with the patient in the knee chest position, gravitate out of the pelvis. With the injection of gas controlled as to quantity, temperature and pressure, there seems to be very little danger in this procedure. Carbon dioxide, since it is rapidly absorbed, is preferable to oxygen in this work.

In the presence of contraindications, such as pregnancy or cervical and uterine discharge (purulent or bloody), the gas instead of being introduced through the cannula in the uterus, is run through the abdominal wall. When tubal obstruction is apparent from the manometer readings, the lower route is abandoned. Approximately one thousand cubic centimeters of the gas are required in each case.

With the patient in the knee chest position two cross sections of the uterus are obtained, one at the fundus and the other at the isthmus. The fundus is separated from the bladder by the uterovesical space which under these conditions contains gas. A relaxed perineum alters the position of the uterus and interferes with the view. The broad ligament hanging vertically presents a thin edge so that thickening or tubal involvement is easily noted. The rectum throws a cylindrical shadow along the hollow of the sacrum. Tubal disease, ovarian cysts and fibroids cast shadows that are characteristic. Without the history given, pregnancy has been repeatedly diagnosed at the sixth week.

When bimanual examination is unsatisfactory, the information gained by this method is frequently of value in deciding the necessity of operation. The technique is simple and inexpensive. The method will eventually become a valuable diagnostic adjunct.

H. W. SHUTTER.

Deucher W. G.: Digital Examination of the Uterine Cavity. Schweizerische Medizinische Wochenschrift, 1923, liii, 277.

There are many types of vaginal bleeding, especially in women near the menopause where the usual examinations will not suffice for an accurate diagnosis. The case may be curetted and the scrapings examined microscopically with a negative report returned and yet if the uterus be extirpated repeatedly newgrowth will be found, deep in the wall or in some of the appendages. The writer insists that dilatation of the cervix with Hegar dilators plus the use of laminaria will make it possible to examine the uterine cavity digitally and thus assist materially in making an accurate diagnosis. He reports 120 cases and of these, the laminaria were not

needed in 58 cases; in 55 two laminaria were used, and in four cases three were employed. Fifteen per cent of the cases were incorrectly diagnosed by the usual methods but with the digital examination the following diagnoses were made: malignant newgrowth, 2 cases; submucous fibroids, 7; uterine polyps, 6; pregnancy, incomplete abortion and missed abortion, each 1 case. Digital examination of 22 cases of suspected fibroids revealed that 3 were malignant newgrowths, 5 were uterine polyps, and two were really fibroids. Following this type of examination a moderate rise of temperature was observed in ten per cent of the cases only, and rarely was it necessary to use opium to allay pain.

A. C. WILLIAMSON.

Hesse, W.: The Diagnostic Value of Digital Exploration of the Uterine Cavity in Cases of Anomalous Bleeding. *Münchener Medizinische Wochenschrift*, 1923, lxx, 51.

In this series of 400 patients the dilatation technic of Walthard was used. The cervix is dilated by use of the Hegar dilator plus the laminaria, one, two or three being used as it is considered advisable. In cases where the tents alone were used there was a febrile reaction in but 7 per cent of the cases, while in those where the metal dilators were used the incidence mounted to 42 per cent. As soon as fever is noted the laminaria are removed until temperature has returned again to normal. Uteri which are apparently empty are curetted carefully for microscopic examination. Changes in the mucous membrane and the uterine walls are easily detected and if anything escapes the finger careful curettage afterward will usually prevent a slip. Digital exploration is employed not only in cases of anomalous bleeding with a changed uterus, but also in cases where the uterus and its appendages seem to be normal.

A. C. WILLIAMSON.

Driessen: Diagnostic Curettage. *Nederlandsch Maandschrift voor Geneeskunde*, 1923, xi, 677.

Driessen calls attention to the fact that, while a minor operative procedure, curettage is not without danger and should therefore not be undertaken under unfavorable surroundings. He feels that when doing a curettage one should always be prepared to do an hysterectomy. To the usual dangers of curettage, namely perforation, septic infection, exacerbation of an existing inflammatory process and obliteration of the uterine cavity, he adds hemorrhage. He cites a case of his own and one of a colleague in which more dilatation caused bleeding of such severity that a prompt hysterectomy had to be performed in order to save the patient's life. In both cases the bleeding was caused by a malignant chorionepithelioma. Since both of these cases had been curetted previously, they accentuate the necessity of examining all curettings. Driessen feels that while menorrhagia is not ordinarily an indication for curettage, metrorrhagia is practically always, even when the diagnosis seems proved clinically. He applies this rule to fibroids which are to be subjected to radiation. He is inclined to curette for all bleeding near the menopause and calls attention to the care required in making a diagnosis, as the premenstrual endometrium has been mistaken for malignant adenoma. He believes that corpus carcinoma is more common than usually supposed. In eighty-five women over forty which he curetted previous to radiation, he encountered carcinoma thirteen times. He employs either ethyl chloride or ether as an anesthetic.

R. E. WONGS.

The American Journal of Obstetrics and Gynecology

VOL. VII

ST. LOUIS, MAY, 1924

No. 5

Original Communications

ENDOMETRIAL TISSUE IN THE OVARY*

BY OTTO H. SCHWARZ, M.D., AND ROBERT CROSSEN, A.B.,
ST. LOUIS, MO.

THE presence of endometrial tissue in the ovary was regarded as a condition of unusual rarity until the recent work of Sampson appeared. Up to the time of his publication in the *Archives of Surgery* in November, 1921, there were less than twenty cases of this type reported in the literature. W. W. Russell was the first to report a case in 1899 while Pick in 1905 in Germany described four cases of his own and mentioned four others including Russell's in the literature. Koeh in 1911 reported a case associated with the presence of so-called psammoma bodies in the ovary. The finding of these calcified areas associated with this lesion has been noted by us in the present work and we will comment on its significance later. Additional cases were reported in 1919 by Norris, Cullen, Casler and Schwarz. Since the publication of Sampson's first article, in the autumn number of the *British Journal of Obstetrics and Gynecology*, 1922 there appeared three articles by Blair Bell, Donald and Shaw, respectively. These articles collectively described seven cases. The latter two authors discussed the association of the lesion of adenomyoma of the rectovaginal septum as was previously pointed out in Sampson's first publication. Bell and Shaw both emphasized the fact that the condition has been overlooked because in the later stages of the lesion the epithelium is lost and the tissue therefore cannot be identified definitely as endometrial in structure. Bell is inclined to believe it to be

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."



Fig 1—Path. No 1624. Low power of cross section of entire ovary. In the left middle portion of the picture is seen a small hematoma 5 mm. in diameter superficially placed and having no deep connection with the ovary. Immediately above is seen a cavity filled with blood and lined by typical endometrial tissue. A similar cavity is found in the extreme upper and middle portion of the ovary. Note the adhesion in the upper left portion of the ovary. This adhesion contained much blood, stromal cells and gland tissue. The superficial nature of this lesion can be seen by the fact that it is well without the ovarian cortex in all places. This ovary was practically of normal size and was covered with definite adhesions.



Fig 2—Path. No 1624. Shows the characteristic endometrial lining of cavity. The lumen contains some clotted blood. This cavity is situated outside the ovarian cortex.

a congenital aberration rather than a metaplasia or cellular spill. Shaw feels with Sampson that the association of "tarry cysts," as the Englishmen called them, shall prove to be of frequent occurrence. Janney, of Boston, in February, 1922, reported two cases of his own and discussed at great length a congenital theory as regards the origin of the lesion and associated this theory with a very thorough embryological study. He mentioned at the end of this article the appearance of Sampson's work and stated that this would lead one to believe that the lesion was rather frequent. In November, 1922, Sampson's most important article appeared. This paper dealt chiefly with the lesion in the ovary in its earlier stages in contrast to the first article which described chiefly the later stages of the disease. The points emphasized by Sampson in this article need careful study and only in this way can the full value of Sampson's great contribution be appreciated. In this publication he mentions that he encountered the lesion in the ovary in a period of a year from May 1, 1921, to May 1, 1922, in forty-three cases in 170 abdominal operations.

After hastily reading this article, we consulted our files and began looking over old sections, and in going over several hundred slides we encountered several interesting lesions in this chance way. This convinced us definitely that the lesion must be quite frequent but we questioned whether these lesions were originally transplants resulting from the escape of epithelium or uterine mucosa from or through the fimbriated end of the tube. We also were much interested in the description of the life history of these lesions and we feel from our present study that we shall be able to demonstrate the correctness of Sampson's views as regards particularly the later changes in these hematomas. We had previously regarded the lesion as having its beginning from the germinal epithelium and the underlying connective tissue and were of the opinion that on account of the close relationship of the tissues involved it was not unreasonable to assume that under certain stimulation such a metaplasia could occur.

Unfortunately, we have been unable to study the pathological lesion at its best, that is, as it occurred in the abdomen at the time of operation. The material which we studied was all from specimens that had been fixed and handled more or less repeatedly and which in many instances had been mutilated by previous sectioning. Further, the operators who were responsible for the removal of the material we are sure in a large percentage of cases did not remove the ovary on account of this particular lesion and perhaps did not remove ovaries the appearance of which might suggest the lesion. We, therefore, could not hope to find the lesion with the same degree of frequency that Sampson did in his original publication. We felt, however, that if we were able to find it in any degree of frequency we would be able

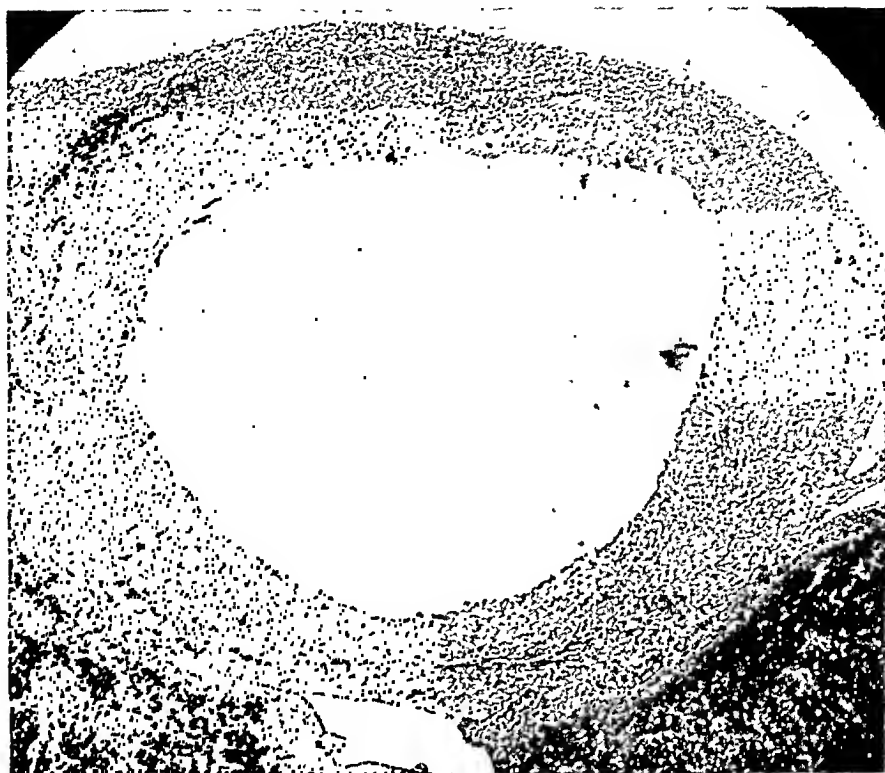


Fig. 3.—Low power hematoma mentioned in Fig. 1. Epithelial lining is not present in this lesion but the wall contains much old blood pigment, connective tissue cells and large mononuclear wandering cells.

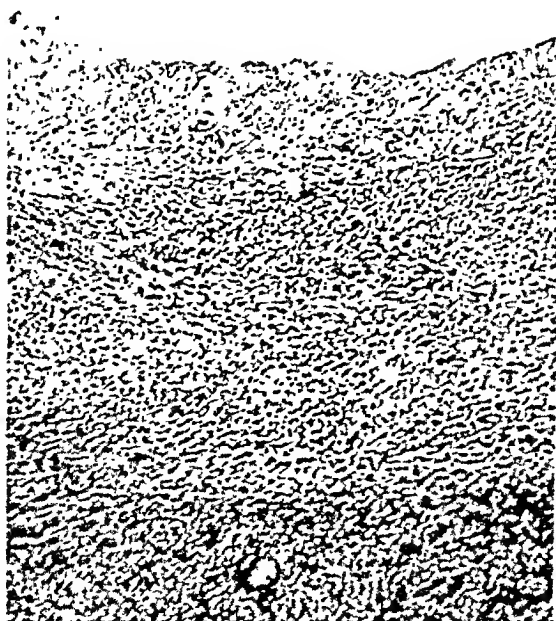


Fig. 4—High power of Fig. 3 showing structure of the wall.

to study the various types of the lesion in sufficient number and be able, therefore, to comment on their characteristics.

Before taking up the study of our series, we shall briefly mention some of the more important points which Sampson has emphasized. He believes that the lesion occurs as the result of the escape of uterine mucosa or tube epithelium from the fimbriated end of the tube. The most frequent location where this material becomes implanted is the under and lateral surfaces of the ovary. He states his reason for this location by reason of the fact that the fimbriated end of the tube in most instances is in close connection with these areas. He mentions the culdesae as the second most frequent site and describes the implants there as primary, or secondary to a ruptured perforating endometrial cyst of the ovary. He describes hematomas of two types, namely, superficial and deep as they are situated on the surface or deep in the cortex of the ovary. The superficial hematomas are small, rarely larger than 5 mm. in diameter, frequently no larger than 1 mm. to 3 mm. in diameter. They are usually multiple and can be found in various stages of their development and retrogression. They are lined by epithelium similar to the uterine or tubular epithelium with or without stroma and almost always associated with hemorrhage in the underlying tissue. These structures may rupture and discharge their epithelial lining; if this occurs, the life of the cyst is ended and retrogression takes place. If the lining of the cyst is only cast off in part, then the cyst may close and reform and the perforation may be repeated. The perforation with its discharge of endometrial tissue frequently leads to secondary transplantation on the pelvic peritoneum, the rectal, sigmoid and other structures, most frequently, however, in the culdesae.

Sampson describes the deep hematomas as arising from glands or tubules which have reached the deeper structure of the ovary and a hematoma of this type may in time perforate and when it does it may be of considerable size, several centimeters in diameter, 9 cm. we believe is the largest he describes. The hematoma, however, may increase so slowly in size that it may never rupture and ceases to grow after the menopause. Further, the epithelial lining of the hematoma may be completely cast off as the repeated reactions of menstruation and the life of the hematoma ceases, and if small may be completely absorbed. A most interesting reaction takes place in the tissue surrounding these hematomas. We take it that this description applies chiefly to those hematomas which do not rupture. As a result of the repeated reaction of menstruation, the blood accumulates in the cavity of these hemorrhagic cysts, and as there is no avenue of escape, some of it remains in the surrounding tissue. The blood disintegrates, resulting in a diffusion of blood pigment throughout the wall, which



Fig. 5.—Cross section of the ovary. The upper margin of the ovary can be seen as a lighter area just underneath the darker tissue. The larger area of dark stained tissue perforated by glands and showing a considerable cavity is a large endometrial mass superficially placed on the ovary. The ovary in this case measured $4 \times 3\frac{1}{2} \times 1\frac{1}{2}$ cm. and was made up chiefly of a collapsed cavity which had a yellow pigmented lining. We take it that the large cavity shown in the picture represents the above described lesion. The gross specimen in this case was not available.

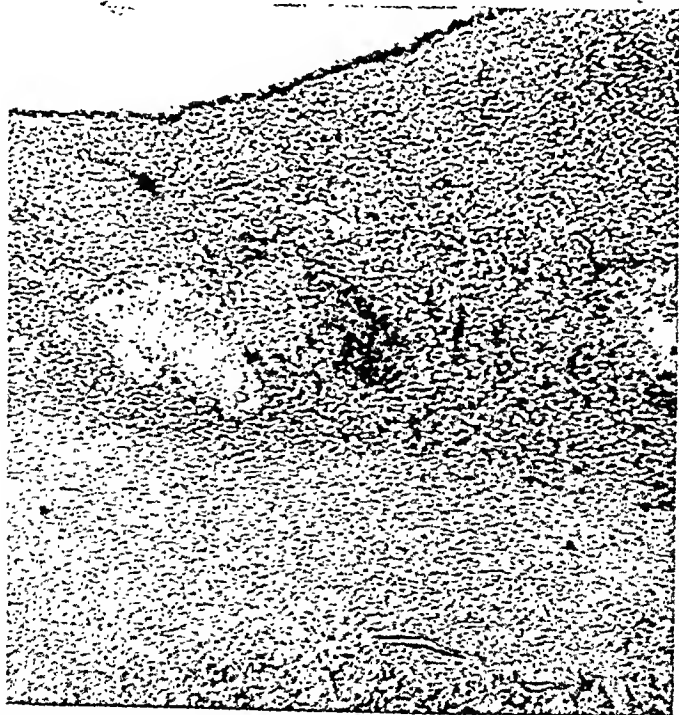


Fig. 6.—High power of Fig. 5, showing lining of the cavity made up of a thick layer of stromal tissue in which the stroma cells were markedly swollen and the gland cells high in character and active. Structure appears edematous and contains blood in the stroma and in the gland lumen. The history was unavailable in this case but we take it that menstruation was about to begin.

in turn is taken up by large mononuclear wandering cells* which appear in large numbers and comprise the chief portion of the wall at this stage. Sampson refers to these cells as the endothelial leucocytes.

It may be well to mention here that in Sampson's first article he states that these cysts may be endometrial at the start or a hematoma arising from ruptured or atretic follicles possibly following ovulation or from an abnormal corpus luteum due to the invasion of epithelial tissue. He mentions that both Runge and Wolfe have demonstrated epithelization of ovarian hematomas by the invasion of the surface epithelium. These linings are described as low cuboidal and columnar in type and Sampson states that if due to the invasion of the surface epithelium a definite metaplasia must take place which makes the tissue appear to resemble the normal endometrium. Sampson in his conclusions mentions as the site of the development of these cysts the ruptured graafian follicle in which the endometrial tissue may have become implanted. In his last article in which he deals with the lesion chiefly in its earliest stage, he does not emphasize this as a frequent location merely mentioning the surface or cortex of the ovary as the site. We may say here that we have encountered four cases in which in the center of the corpus albicans there were present numerous gland tubules which were similar to uterine or tubule epithelium. In one instance there is a definite lining with the remains of old blood in the underlying tissue. These cases will be illustrated and further comments will be made in the accompanying legends. It is interesting to mention while commenting on the peculiar lining of these old endometrial cysts that Novak although he illustrates beautifully certain types of ovarian hematomas, namely, the follicular, the corpus luteum and stromal types, does not describe a lesion with a picture similar to those of the old endometrial cysts whose wall is so studded with the large mononuclear wandering cells.

Our study consisted of the examination of 420 ovaries. Of these 256 specimens were taken from the files from which no gross specimens were available. In these cases in many instances only one section could be studied but in the remaining 164 cases numerous blocks were taken from one or both ovaries whenever we found, as we termed it, a suspicious area. As we have previously mentioned, under these circumstances we could by no means hope to find the lesion in the same degree of frequency that Sampson did, but felt that we might find the lesion in some degree of frequency sufficiently great to study the lesion in all of its stages. We decided to class into groups as follows:

In the first class were the superficial lesions which definitely contain endometrial glands and stroma and cysts lined with endometrium. Second, the hematomas of endometrial type. Third, ovaries with ad-

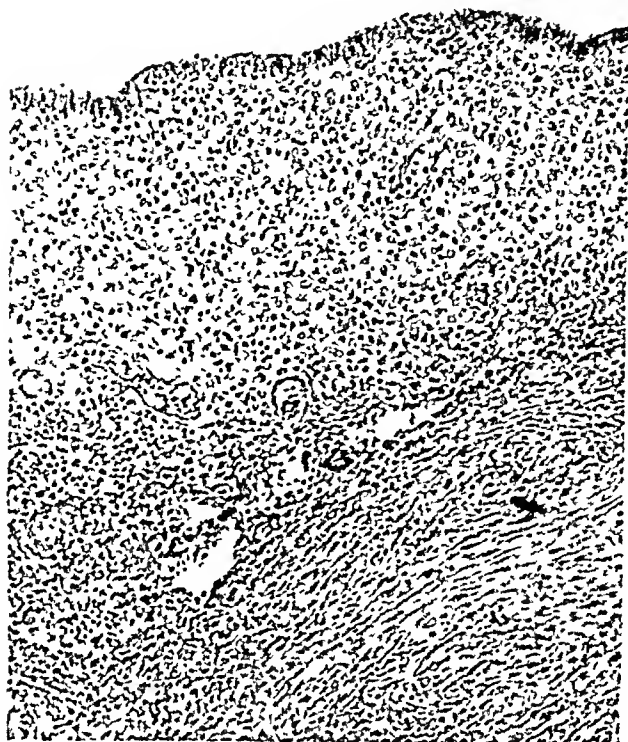


Fig. 7.—High power of Fig. 5, showing the relation of the stroma to the underlying ovarian tissue and the swollen character of the cells in this case.

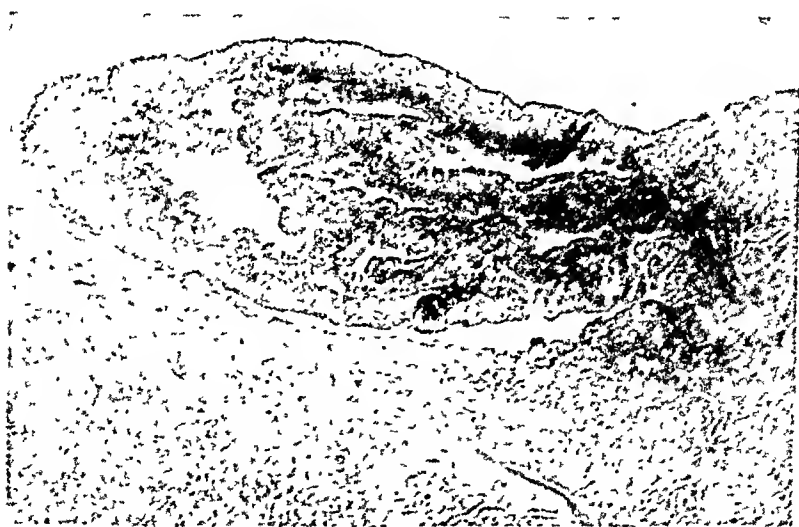


Fig. 8.—Illustrates a case in which there is a large plaque of endometrial tissue adherent to the surface of the ovary. This tissue is markedly congested, contains numerous glands and has the characteristic stroma. Other portions of this section showed endometrial tissue invading the ovarian cortex.

hesions in which the adhesion consisted of blood, stromal tissue and occasionally included glands. Fourth, lesions in which there were numerous tubules in which there was no definite accompanying stroma. It may be stated in making this classification numerous specimens were discarded which could possibly have been placed in either group two or group four and some even in the first group, but we felt that the inclusion of these suggestive cases would warrant additional explanation and, therefore, add confusion. In the first group there were fifteen cases, in the second group there were eleven cases, in the third group there were eleven cases and in the fourth group there were eighteen. We feel that the cases described in groups one and two are absolutely of endometrial origin. In the third a large percentage of them can be considered transplants without any hesitancy. Whereas in group four the origin of the tubules must be considered before classification here would be definitely possible.

In the group of 164 cases in which the gross specimen could be studied more or less intact, there were eleven cases with endometrial tissue and seven with hematomas of the endometrial type showing a total of eighteen cases for this group. In studying the sections from the cases in which the gross specimens were not available, five cases with true endometrial tissue were encountered and four of the hematoma type. This shows very clearly a very much higher percentage of cases for the series in which the gross specimens were studied.

In the first group were placed those cases in which the endometrial tissue was found on the surface of the ovary, in the cortex of the ovary or lining a cyst. These cases represented chiefly cases in which the endometrial tissue was limited to the surface of the ovary or involving only a very superficial portion of the cortex. The cavities connected with these cases were all very small and appeared to have either a direct connection with the surface or connected themselves with the surface by perforation. The endometrial structure in these cases was very well developed, the stroma quite characteristic and the glands very clear cut. There were four cases in which the endometrial tissue was found lining a cyst. These cysts were in each case of fair size, the smallest being $2\frac{1}{2}$ cm. in diameter and the largest 10 cm. in diameter. In each instance these cysts were lined by an epithelium which was similar to the endometrium and an occasional gland was found below the lining epithelium. The underlying tissue showed a definite stroma which was markedly congested and which showed the presence of blood pigment both microscopically and in the gross. In the gross these walls have a characteristic dirty, yellowish brown color with a comparatively smooth lining. In the wall one finds in addition to the stroma cells large wandering cells which are one of the chief characteristics of the

hematoma type of this lesion in absence of the epithelium. Another feature of the lining is the connection of these cysts with the adjacent tissue. The line of demarcation between the tissue of the cyst wall and the ovarian substance can be readily distinguished. Although these cysts were found in the collapsed state, frequently there



Fig. 9.—Path. No. 793. This is a picture illustrating two endometrial cavities in the ovary. This case was reported by one of us previously. The cavities are superficially placed in the ovary and have literally pushed the cortex of the ovary ahead of them. Note that typical gland tissue is seen only in two areas, the remainder of the cavities being lined by a single layer of epithelium and stroma cells. The ovary in this case was about the size of a hen's egg. The cavities were not larger than three-fourths of a centimeter to one centimeter in diameter.

is a definite line of separation. The description made at the time when they were first received in the laboratory showed all of them to be filled with clotted blood. In one instance a definite perforation was found around which there was an area about 1 cm. in diameter covered with old blood and having a ragged appearance. The size

of the perforation was about 3 mm. in diameter. This was in a comparatively small cyst $2\frac{1}{2}$ cm. in diameter. The study of these specimens rather definitely brings out their close association with the surface of the ovary and in illustrating this group it is one of the chief points we wish to emphasize particularly. In a word, the endometrial tissue appears on the surface of the ovary in such a way that it appears to be glued on and gives the impression that it only reaches a deeper situation after it has been present on the ovary for some considerable time.

In the second group, the group of hematomas we believe to be of endometrial origin, there were eleven cases. This group was most interesting because the structure of the wall in these cases is very characteristic and Sampson's descriptions are absolutely correct in this regard. We had unusual opportunity to study the character of such a hematoma because we found one in association with a case of real endometrial tissue, a case placed in the first group. This case is represented in our illustrations and it shows a comparatively small ovary upon which there is ingrafted definite endometrial tissue associated with this superficial hematoma. The hematoma is placed on the top of the surface of the ovary and is not in any way connected with the deeper structure. Its wall is unusually round and colored a yellowish brown. Its lumen was filled with blood and on histological examination it showed only a blood-stained wall due to the diffusion of blood pigment cells of the connective tissue type and a large number of cells mononuclear in type containing much blood pigment. These cells are the so-called endothelial leucocytes which have been previously mentioned by Sampson. This cavity was small and measured only 5 mm. in diameter. In studying the wall of the hematomas in this group as a whole, the pictures coincide exactly with that which we found in this superficially implanted hematoma. In going through the series a large number of hematomas were encountered, particularly a large number of follicular hematomas as well as numerous corpus luteum cysts. We have never seen this reaction in any way characteristic in these two lesions. In fact, the walls of the corpus luteum cysts are notably free of blood pigment and the lutein cells in more or less state of preservation stand out clearly against the adjacent ovarian tissue. In the stromal hemorrhages one occasionally sees this same reaction, but the irregularity of the lesion and the fact that the condition is never well marked would lead to little confusion with the hematomas that were previously lined by endometrium. Another feature which is quite characteristic is their clear cut demarcation from the surrounding ovarian tissue. The hematomas in this group varied in size from $\frac{1}{2}$ cm. in diameter to 5 cm., several being about 5 cm. in diameter. They all showed in



Fig. 10—High power of the upper cavity in Fig. 9, showing a beautiful pattern of endometrial tissue. Note the tissue immediately below the endometrium. We previously described this as muscle tissue. We feel now that it is only a hypertrophy of the connective tissue *in situ*.

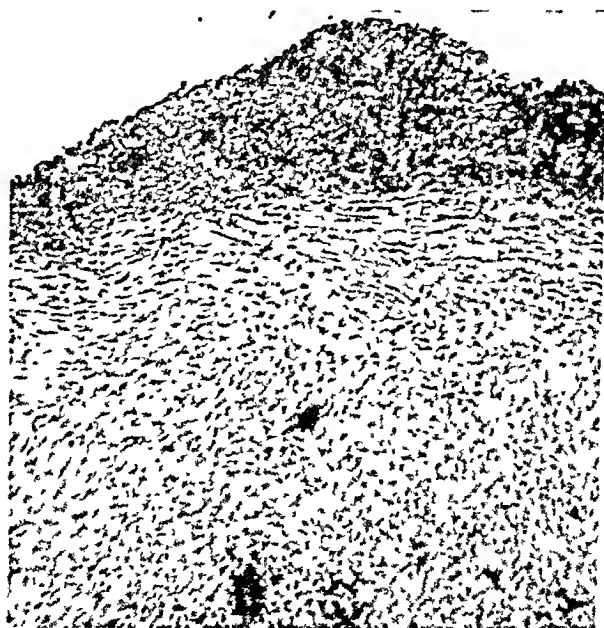


Fig. 11—Shows superficial implant of stromal tissue on surface of ovary. Case from collection of Dr. George Ives.

part this pigmentation and presence of the wandering cells and several of them very beautifully. In one instance we found definite endometrial epithelium lining one of them. This was in a cyst 2 cm. in diameter which was in the right ovary and the left ovary contained a beautiful example of an endometrial hematoma and was only $\frac{3}{4}$ of a centimeter in diameter. As we have previously mentioned, Novak in his very well written article on hematomas of the ovary, does not describe a hematoma of this character and as Sampson has previously stated this type of hematoma must be included as an additional entity. It may be stated that in every instance either the gross specimens or in those cases in which the gross specimens were not available there was a description of adhesions and clots about the ovary.

The third group consisted of ovaries which showed no hematoma or tissue of the endometrial type but about which were present adhesions with considerable amount of old blood and adhesions in which the stroma was very cellular, in other words having the appearance of endometrial stroma. Twelve cases were placed in this group. In several instances there was found associated with these adhesions definite epithelial tissue and in five cases there were definite gland tubules found included in the adhesions. In two of these cases in which glands were found, there were associated with them tiny nodules of calcification. We will speak of this condition later. We feel that in this group are included cases in which stromal tissue and gland tissue is in its earliest process of implantation. In some instances these plaques were quite large, as long as $\frac{1}{2}$ cm. and $\frac{1}{4}$ cm. wide. Usually, however, they were quite small.

The fourth group includes those cases in which gland tubules were found in the ovary in varying number usually well implanted in the cortex. These glands do not in any way resemble the germinal epithelium. They are very high in character and appear more like tube epithelium than the epithelium of the uterine type. They are in some instance surrounded by a definite hemorrhagic area and there is blood within the lumen but this reaction is absent as frequently as it is present. In some instances these gland tubules are seen markedly dilated and containing some red blood cells within their cavity. As we have mentioned, they are most frequently found in the upper ovarian cortex but may be deeper. Glands of similar structure have been found in the superficial epithelium. In one instance a group of five or six such tubules was found implanted on the very superficial portion of the ovary well outside the tunica albuginea. There were four cases in which this glandular epithelium was found well situated in the corpus albicans and it is interesting to note that in two of these cases there was associated with this epithelium true endometrial

tissue in the ovary. Another interesting condition which we met with in one instance was the fact that the fimbriated end of the tube was abnormally adherent to the ovary. Immediately below this attachment and extending for some distance into the ovarian substance were numerous tubules of the type that we have described as characteristic of this group. This picture very strongly suggests the transplant



Fig. 12.—Path. No. 1992. Cross section of ovary. The ovary in this case measured $3\frac{1}{2} \times 2\frac{1}{4} \times 1\frac{1}{2}$ cm. In the upper portion of the picture is a follicular cyst. The lower large cavity which is not quite complete is a typical endometrial cyst. Note the dark area running around this cavity quite well seen in numerous places. This is due to hemorrhage underneath the epithelial lining in the compressed stromal tissue. To the left and in the middle of the picture near the periphery are three small cavities. These are lined by epithelium similar to uterine epithelium. The size of the endometrial cyst was $2 \times 1\frac{1}{2} \times 1\frac{1}{2}$ cm., and was lined by a dirty yellowish-brown membrane. There was an irregular surface with adhesions and old blood covering an area about 1 cm., in the center of which there was a distinct perforation 3 mm. in diameter.

theory for this type of lesion as well. We may say here that when the germinal epithelium is associated with adhesions of the vascular type it has a tendency to take on the appearance of the type of cell

in these glands. Although we have seen this change not infrequently, we have never seen any gland formation immediately below it.

As Sampson has described the life history of the hematoma of the endometrial type, we feel that these tubules also undergo characteristic changes which finally obliterate them. We have found in association with these lesions six cases in which there was present a number of small calcified bodies closely associated with the glands. In several instances these calcified areas were very numerous. We have been able to demonstrate that these small calcified bodies have their origin primarily in the lumen of these tubules and our illustrations will bear this out. Two cases were encountered in which these calcified bodies were found in adhesions and in one instance this association with a gland tubule could be demonstrated. It might be said that these lesions occur in comparatively old ovaries, in other words, of the sclerotic type as in most instances there was present comparatively little functional tissue. Calcification in the ovary has been described by several writers and it has been chiefly described as occurring in the corpus albicans. Moskowitz described five cases one of which showed true bone formation. These were associated with the corpus albicans and were all several millimeters in diameter, the largest being a calcareous mass $1.7 \times 1.3 \times 1$ cm. in diameter. Koeh in 1911 describes calcified lesions in the ovary and terms them psammoma bodies similar to the psammoma bodies that are described in connection with the central nervous system. He finds these in the ovary associated with the corpus albicans, in neoplasms of the ovary and also in the case of endometrial tissue in the ovary. In this instance he pictures the calcification in the stroma but does not point out any association with the glands although several of the bodies are situated in close relationship to the glands. We feel that this is a method by which these gland tubules are obliterated in the ovary after menopause. It is also interesting that in the corpus albicans we find occasionally this same type of epithelium and although we were not able to demonstrate calcification associated with any of our four cases, we felt that perhaps the calcification that has previously been described in association with the corpus albicans may have their origin in such gland inclusions.

In connection with this paper, we are including two cases which have some bearing on the subject of endometrial tissue in the pelvic cavity as a whole and, therefore, have illustrated them and will include them in this paper. The one case is a fallopian tube in which we believe endometrial stroma could be demonstrated. In this case both adnexa were matted together with dense adhesions the tubes being very much enlarged and the ampulla of one dilated to $2\frac{1}{2}$ cm. This tube was filled with a semisolid chocolate colored material. As

the specimen was presented from outside sources no accompanying history was found. The endometrium shows a marked edema with the presence of blood cells in the stroma and in the gland lumen suggestive that menstruation was about to begin. The section through



Fig. 13.—Higher power of Fig. 12, showing the epithelial lining and showing the obscurity of the structure beneath it, due chiefly to the presence of marked hemorrhage.



Fig. 14.—Ob. Path. No. 2076. Shows a group of glands invading the superficial portion of the cortex of the ovary. There is a slight hemorrhagic reaction around these tubules but no stroma is present. This is the type of case that was placed in group four.

the dilated tube which contained the chocolate colored material showed a thin-walled tube not more than 3 mm. in diameter in its greatest thickness and everywhere lined by well-developed tube epithelium. This epithelium was unusually high and also there was a definite

increase in cells below the lining; there was little or no evidence of inflammation there being only a small number of small round cells. The wall showed no inflammatory reaction. Throughout the extent of the lining of the tube there was present fresh and old blood very much similar to the lining seen in the hematoma in the endometrial cyst. The picture is very suggestive of tube menstruation and the structure of the tube as a whole has more the appearance of endometrial tissue than that of the tube. In one point in the lining there was found a small area over which the lining epithelium was absent and which appeared definitely as endometrial stroma. We do not know what the nature of this tissue could be if it were not tissue that could be classified as of the endometrium. When we encountered this area we immediately examined the original block and cut numerous sections. Although these sections showed the same characteristic appearance of the tube, this same plaque of supposed endometrial stroma did not appear in the sections although the large gland immediately below it could be identified. The area above was covered by a layer of epithelium which was absent in the particular section which showed the stromal tissue. We, therefore, felt that if this was endometrial stroma it occupied only a very small area. (Figs. 20 and 21.)

The other case was one in which endometrial tissue was found in the wall of the appendix and the appendix was removed by Dr. Major Seelig for a chronic appendicitis and we have not included any data concerning this case as Dr. Seelig wishes to report the case in full at a later date. The organ in this case was very definitely thickened, markedly adherent and surrounded by old blood. On section the wall was shown to be enormously hypertrophied. The peritoneal surface had been torn and could not be identified, but at the immediate periphery of the specimen one could demonstrate typical endometrial tissue entering the wall. There were numerous islands of endometrial tissue scattered throughout the wall and every section taken, some six or seven, showed this structure very characteristically. One section, which I unfortunately did not illustrate, shows the tissue in connection with the mucosa of the appendix. The muscular tissue of the appendix was markedly hypertrophied and there was a definite scantiness of lymphoid tissue throughout. There was no inflammatory reaction in the appendix, it was comparatively free of anything that suggests even chronic inflammation. We feel that this case is of particular interest on account of the muscle tissue hypertrophy. When Sampson's paper came out describing endometrial transplants in the culdesac associated with hemorrhagic cysts in the ovary, we were struck with the fact that in connection with these lesions there was no description of a markedly hypertrophied muscle tissue.



Fig. 15.—Case No. 33. From collection of Dr. George Ives. This picture shows a cyst with an epithelial lining in the center of a corpus albicans. This case also showed typical endometrial tissue on the surface of the ovary.



Fig. 16.—Surg. Path. No. 4698. Shows an abnormally adherent fimbriated end of the tube to the surface of the ovary. Throughout the left half of the picture can be seen glands in the substance of the ovary. The close connection of these glands with the fimbriated end of the tube is very suggestive that they were derived from the epithelium in contact with the ovary.

The cases described by Cullen in which the pelvis is literally glued together by the lesion always showed a well-developed, smooth, muscle tissue accompanying the endometrial glands and stroma. It can, therefore, be easily explained then in the appendix and if this applies to the appendix it applies elsewhere that in the presence of these penetrating glands the tissue *in situ*, namely, the muscle tissue and connective tissue, undergo marked hypertrophy and in this way the lesion that Sampson has described can be considered an earlier stage of the type of lesion that Cullen has so extensively described. In the case which was reported by me several years ago of endometrial tissue in the ovary, we described the tissue immedi-



Fig. 17.—Ob. Path. No. 653. Shows three small circumscribed areas in an adhesion attached to the surface of the ovary. The nodule to the left is lined by typical glandular epithelium.

ately surrounding the cyst as hypertrophied, smooth, muscle tissue. This should be described only as the hypertrophied connective tissue of the ovary immediately surrounding the lesion. Some regard the peculiar stroma of the ovary as smooth muscle, but most texts refer to it as ovarian connective tissue. In its appearance, however, it resembles smooth muscle tissue and stains similar to smooth muscle tissue with Van Gieson's stain. We believe W. W. Russell in the description of his first case in 1899 made a similar description as regards his case. We believe this now to be a hypertrophied ovarian connective tissue which surrounds this lesion and not similar to hyperplastic uterine muscle which surrounds the lesion of so-called diffuse adenomyoma of the uterus.

Since writing the above, our attention has been called to an article by Blair on ovarian hematoma in the September number of *Surgery, Gynecology and Obstetrics*. He refers to an article by J. V. Meigs of Boston who reported in July, 1922, sixteen cases which he collected from the material of Dr. Graves. He enumerates various theories as



Fig. 18—High power of nodule to the left in Fig. 17. Shows connective tissue invading the gland lumen and surrounding the calcified area. Note the typical gland structure still remaining



Fig. 19—No. 1403. One entire surface was literally studded with small gland tubules without stroma. Numerous small areas of calcification are seen in this field associated with the glands. This patient was forty years of age and had never been pregnant. The ovary still contained a fair number of primordial follicles and several developing follicles were seen.

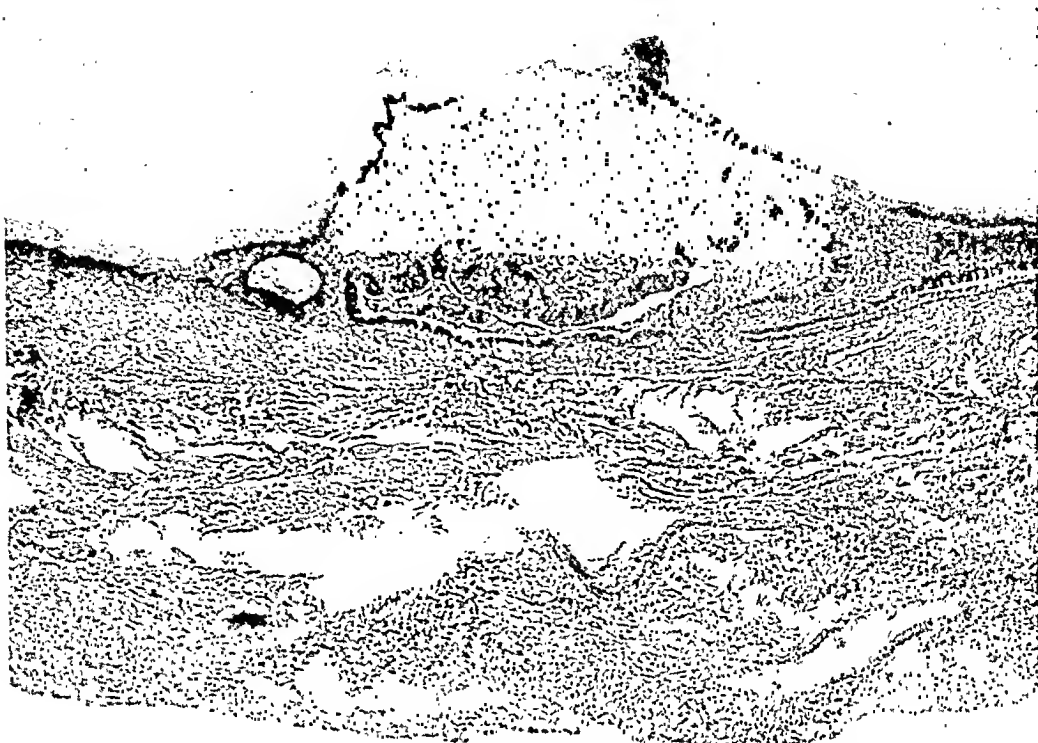


Fig. 20.—No. 1987. Entire tube wall showing plaque of tissue similar to endometrium. Case of hydrosalpinx. Cavity contained some blood. There is blood present throughout the tube under the epithelial lining and the epithelium was high in character; the picture suggested tubal menstruation. Inflammatory cells were not conspicuous in this specimen. There was some round-celled infiltration.

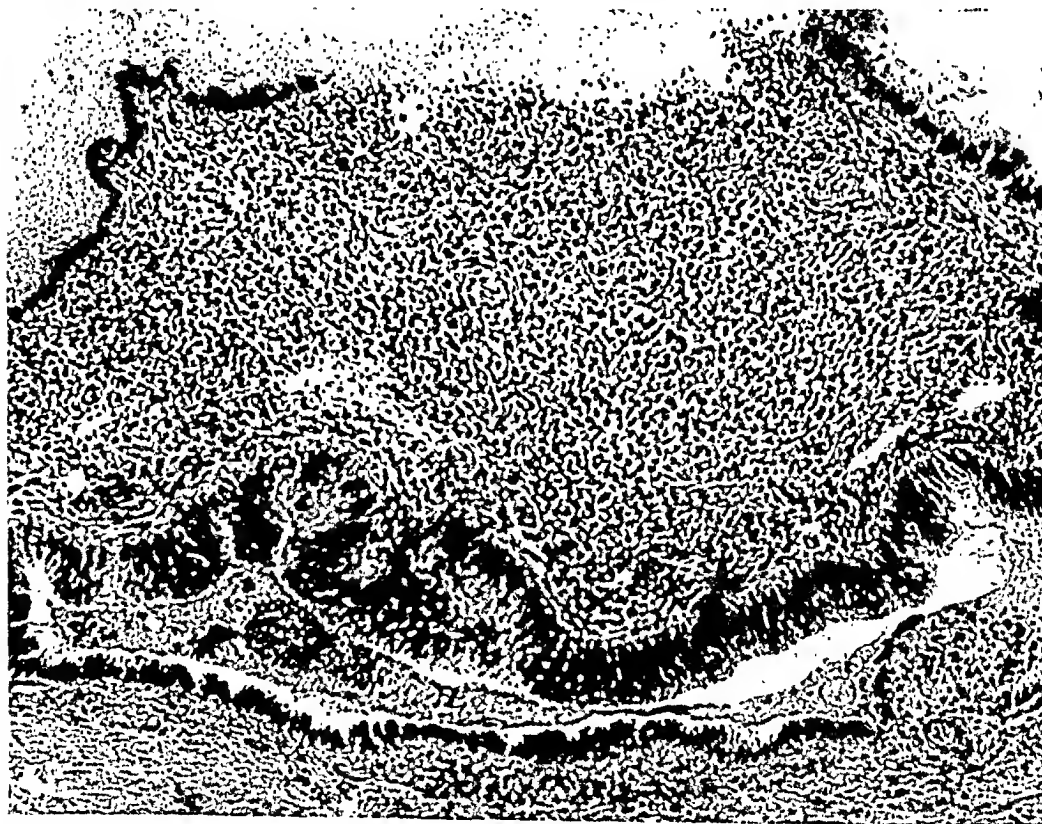


Fig. 21.—High power of Fig. 20, showing an area with the tissue resembling endometrial stroma. The cells are chiefly of connective tissue type, there being a small number of lymphocytes present as well.

regards the origin of these lesions in the ovary and apparently emphasizes that a metaplasia of the germinal epithelium takes place in some instances. The lesions were for the most part of the hematoma variety in which there was definite endometrial tissue. This writer apparently is convinced of the frequency of the lesion. The cases are reported with case histories and microscopic descriptions of the lesions. The diagnosis was in each instance confirmed by Mallory, pathologist of the Boston City Hospital.

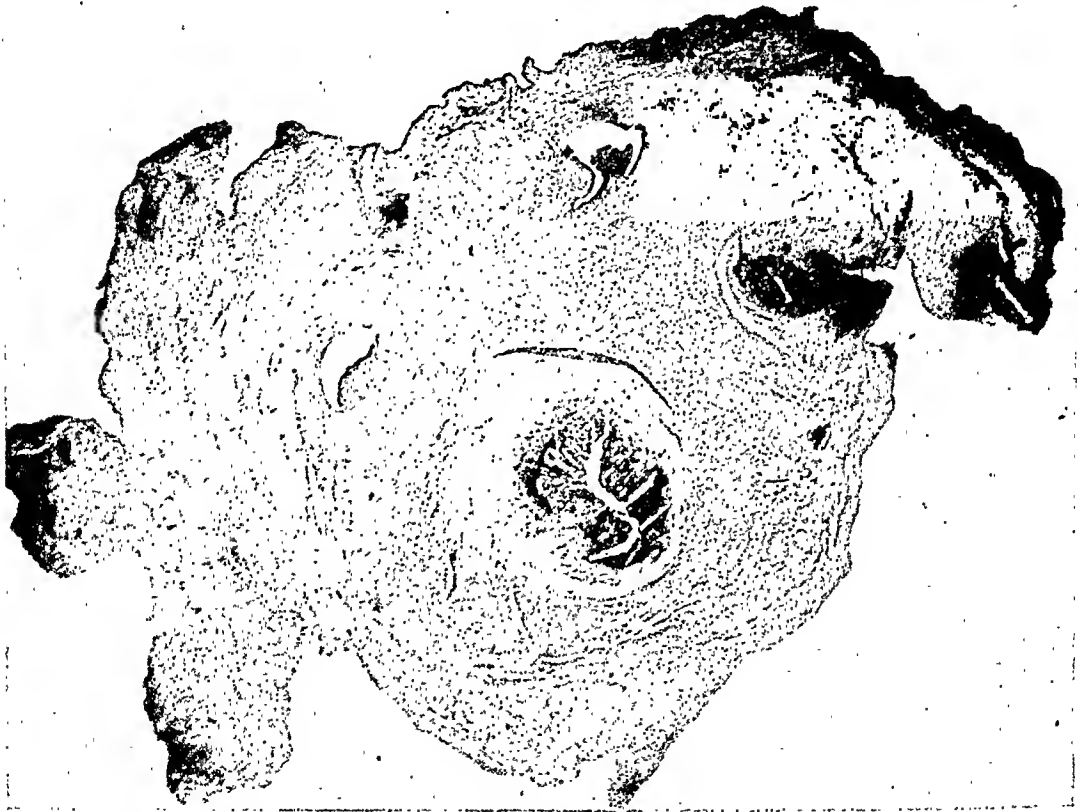


Fig. 22.—Cross section of the appendix. Dr. Seellg's case. The lumen of the appendix is seen near the center of the picture. There is also some lining mucosa seen toward the upper right portion of the picture. This suggests that the appendix was turned just where this section was taken. Note the enormous thickness of the muscle tissue of the wall. The two cavities seen above and to the left of the lumen are lined with endometrial tissue.

We wish to state that we are indebted to Dr. Crossen for the opportunity of studying much of his material in this series. We also wish to thank Dr. George Ives for supplying us with some of his material.

SUMMARY

We feel we have been able to study a sufficient number of cases of endometrial tissue in the ovary to allow us to observe the lesion in most phases of its life history. The frequency with which we encountered the lesion in our series leads us to believe that it is quite

common. However, its real frequency can only be determined by the surgeon who is familiar with the lesion in all its phases and studies his own material while fresh and also microscopically. Under such circumstances Sampson's figures as regards the frequency of the lesion should be duplicated easily. The lesion in the stage which represents a hematoma surrounded by a wall containing old blood, connective tissue cells and large mononuclear wandering cells without any epithelial lining can be easily overlooked. Sampson's picture describing this late stage is very characteristic. We have failed to observe this lesion in connection with definite lutein and follicular



FIG. 23.—A large cavity in the wall of the appendix lined by endometrial tissue and containing a large plug of typical endometrium.

hematomas in various stages although we observed these conditions in considerable numbers in our series. Occasionally there was a somewhat similar appearing lesion in small stromal hemorrhages, but this occurred in a rather irregular manner and never in the same characteristic way in which it was constantly observed in connection with the hematomas supposedly of endometrial origin. The germinal epithelium of the ovary in the presence of adhesions particularly associated with hemorrhage may simulate tube or uterine epithelium. We have observed this frequently but we have not observed the formation of gland tubules beneath such an area nor have we observed any characteristic stroma beneath the germinal epithelium.

We believe that in the case of chronic subinvolution of the uterus with no other lesion present in the wall of the uterus, in the production of the lesion of diffuse adenomyoma of the uterus the glands invade the wall primarily, and that the hyperplasia of the myometrium develops subsequently. That such hyperplasia could occur from glands invading the peritoneal surface is well illustrated by Seelig's case with the lesion in the appendix. Accordingly, we feel that the muscle tissue so well developed in the late stages of adenomyoma of the rectovaginal septum, the type of cases so well described by Cullen, may have its origin in this manner.

BIBLIOGRAPHY

Bell: Jour. Obst. and Gynec., British Empire, 1922 xxix, No. 3. *Blair*: Surg., Gynec. and Obst., September, 1923. *Cullen*: Arch. Surg., 1920, i. *Donald*: Jour. Obst. and Gynec., British Empire, 1922, xxix, No. 3. *Jacobson*: Arch. of Surg., 1922, v. *Janney*: AM. JOUR. OBST. AND GYN., Feb., 1922. *Koch*: Arch. f. Gynäk., 1911, xciv. *Meigs*: Boston Med. and Surg. Jour., July 6, 1922. *Novak*: Bull. Johns Hopkins Hosp., 1917, xxviii, 349. *Pick*: Berl. klin. Wchnschr., 1905, p. 502. *Russell*: Bull. Johns Hopkins Hosp., 1899, x, p. 8. *Sampson*: Arch. of Surg., 1921, iii. *Sampson*: Arch. of Surg., 1922, v. *Sampson*: AM. JOUR. OF OBST. AND GYNEC., November, 1922. *Shaw*: Jour. Obst. and Gynec., British Empire, 1922, xxix, No. 3.

(For discussion, see page 618.)

WASHINGTON UNIVERSITY, SCHOOL OF MEDICINE.

CARCINOMA OF THE UTERUS*

By GEORGE W. CRILE, M.D., CLEVELAND, OHIO

(From The Cleveland Clinic)

PERHAPS there is no field in surgery regarding which there exists a wider diversity of opinion than the treatment of carcinoma of the uterus,—of carcinoma of the cervix particularly. Even before the complex problems presented by carcinoma of the uterus were rendered still more complex by the introduction of treatment by x-ray and by radium, there existed a wide divergence of opinion as to the indications for operation and the type of operation to be performed. Today with the increasing number of advocates of radium and deep x-ray therapy to the exclusion of surgical treatment it becomes imperative for us to examine the evidence presented by the results of various methods of treatment, or of combinations of methods, in the hands of individual operators.

Thus, the American College of Surgeons has attacked as one of its first problems for intensive study the treatment of carcinoma of the cervix; and the uniform presentation of data collected from various clinics covering all phases of incidence, types of tumors, symptoms

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1925.

and operability and the results of various methods and combinations of methods of treatment should throw urgently needed light upon this outstanding problem.

A study of the literature for the past two years, in the hope that we might glean therefrom comparative statistics, shows such a divergence of opinion, and such a divergence of plan of presentation of statistics that it is practically impossible to draw any final conclusions. In this presentation, therefore, I shall, in the main, confine myself to a report of preliminary studies of carcinoma of the cervix and the fundus which have come under the observation of my associates and myself. This study is still in progress and the results reported here and the deductions drawn therefrom are to be considered as the results and deductions of the moment which may possibly be altered by our later investigations.

The results of our statistical studies at the present time are given in Table I and the figures therein suggest the following discussions regarding special features:

TABLE I
END RESULTS—CARCINOMA OF THE UTERUS

	CERVIX		FUNDUS		ALL CASES— FUNDUS AND CERVIX	
Total number of cases	31	251	15	106	46	357
Not treated						
Cases available for study of operability, mortality, etc.		220		91		311
Radical operation	60		70		130	
Palliative operation	105		17		125	
No operation—radium and X-ray only ..	52		4		56	
Operative deaths—radical operation		4		6		10
Operative mortality—radical operation ...		6.7%		8.6%		7.7%
Operability (radical operation)		27.3%		76.9%		41.8%
Cases heard from		130		44		189
Radical operation	42		36		81	
Palliative operation	47		5		52	
No operation—radium and X-ray only ..	50		3		53	
Number of cases surviving 3 years (heard from)		28		14		37
Radical operation	16		12		28	
Palliative operation	4		2		6	
No operation—radium and X-ray only ..	3		0		3	
Number of cases surviving 5 years (heard from)		17		11		28
Radical operation	14		10		24	
Palliative operation	3		1		4	
Percentage of 3 year survivals—all opera- tions		23.5%		34.1%		25 %
Percentage of 3 year survivals—radical operations		38.1%		36.3%		33.3%
Percentage of 3 year survivals—all opera- tions		19.1%		26.8%		20.6%
Percentage of 5 year survivals—radical op- erations		34.5%		27.7%		28.6%

Operability.—Radical operations were performed in 60 of the 220 cases of carcinoma of the cervix regarding which we have sufficient data for study. On the basis of this figure the operability in this series was 27.3 per cent. Among 91 cases of carcinoma of the fundus, a radical operation was performed on 70, making an operability of 76.9 per cent.

Although various reporters have published operability percentages, it is obvious that their figures cannot be used as a basis of comparison unless the judgment of each reporter as to the standard of operability is known. Moreover, it is hardly possible even in the individual clinic to outline definitely such a standard. In general, we consider a case inoperable in which the broad ligaments and the parametrium are involved with extensions to the bladder and ureters and fixation of the uterus. Even this statement, however, must be considered as general, as in every case the possibility of operation must be individualized. Moreover, many cases which upon their first presentation appear to be inoperable, after a period of rest and observation may successfully endure even an abdominal hysterectomy, the change in condition being due to the subsidence of inflammatory processes during the period of rest and selected treatment. Thus, rest in bed before operation often reduces the size of the cervix and shows a diminution of the thickening and fixation of the ligaments. Other indications elsewhere in the body are, of course, also to be considered, although in such cases the inoperable cases may become operable by the appliance of therapeutic measures; thus, for example, a weakened myocardium may be strengthened by digitalis, renal complications may yield to treatment, etc.

Of particular interest in this discussion of operability is the short duration of symptoms and the extent of involvement at the time of operation. Thus, among the cases of cancer of the cervix, in three cases in which the symptoms had been recognized for less than a month, two were diagnosed as inoperable and the vagina was involved in one. In 36 cases in which the duration of symptoms had been less than a year, 30 were inoperable and the vagina was involved in six. These figures emphasize certain points to be made later regarding earlier recognition of carcinoma of this organ.

Incidence.—Our figures show the highest incidence of both carcinoma of the cervix and carcinoma of the fundus between the ages of 50 and 60 years. This is later than the findings of most reporters who place the highest incidence between the ages of 40 and 45 years. As to the occurrence in married and unmarried women, but six of our cases of cancer of the cervix occurred in single women. A similar relation exists in the case of carcinoma of the fundus, our series showing 78 cases among married women as contrasted with 10 among un-

married. These figures combined with the lack of recognition of early symptoms emphasizes the importance of Kelly's suggestion that "(1) The physician attending a woman at labor should, six or eight weeks later, make an examination and find out what lesions remain," and "(2) Every woman who has borne children should have a careful gynecological examination at least once every year until she is 55 years old," as in view of the symptomless early stages only by direct examination can one surely catch the very first stages of carcinoma of either portion of the uterus. This point is emphasized also by the fact that among our cases hemorrhage or other discharge was noted as the first symptom in 122 out of 132 cases of carcinoma of the cervix in which the first symptom was noted, and in 60 of the 68 cases of carcinoma of the fundus in which the first symptom was noted. It will require a very long period of propaganda and instruction of the public and medical profession at large to assure that every woman above the age of 40 will surely look upon any abnormal discharge from the uterus as a suspicious symptom upon its first appearance, especially during the period of the menopause.

Predisposing Causes.—The preponderating incidence of carcinoma of the uterus in married women, especially in women who have borne children, indicates that laceration and irritations of the cervix are certainly to be considered as primary predisposing causes. Poelese reports that chronic endocervitis preceded cancer in 34 out of 48 cases. Ewing maintains that polypoid myomas of the cervix are usually malignant at all ages and that the presence of a myoma in this region, therefore, is to be considered as a definitely premalignant condition.

In carcinoma of the fundus, Ewing believes that myomata are the first causative factors, an opinion apparently borne out by W. J. Mayo who states that "cancer of the cervix occurs 15 times as frequently as cancer of the body of the uterus, but in myomatous disease, cancer of the body of the uterus is found five times as frequently as cancer of the cervix, chronic irritation of the uterine tumors increasing the incidence 75 times." These opinions would seem to be strengthened by the fact that uterine myoma is estimated to be present in 50 per cent of all women over 50 years of age. Any local congestion or chronic endometritis aids the development of carcinoma. Cullen has reported perhaps the earliest squamous-cell carcinoma of the cervix which has been reported, its occurrence being discovered by an examination of the scrapings in a case curetted for hemorrhage due to hyperplasia of the endometrium and a small submucous myoma. Kelly and others urge the importance of most painstaking examination of all curetted material by someone sufficiently expert to recognize the presence of cancer cells.

As for the type of carcinoma, our findings to date coincide with

those reported by Ewing, squamous-cell carcinoma predominating among our cases of carcinoma of the cervix, and adenocarcinoma among the cases of carcinoma of the fundus.

Diagnosis—Early recognition.—In addition to the comments made above, it may be noted that cervical carcinoma yields earlier symptoms than does carcinoma of the fundus and that the symptoms of carcinoma of the fundus are more subjectively urgent; that is, in carcinoma of the fundus pain sometimes occurs due to distention of the muscular wall, whereas unfortunately pain is one of the latest symptoms of carcinoma of the cervix. A leucorrhea or hemorrhagic discharge which may be intermittent or persistent and becomes increasingly fetid in character is usually the primary symptom.

Extension.—Two striking characteristics of carcinoma of the fundus and of the cervix noted by Ewing seem thus far to be borne out by our own observations, that is, the tendency of uterine carcinomata to remain localized. Cullen found the nodes free in practically all cases examined by him. Ewing gives the reports of various observations showing lymph nodes free in a large percentage of the fatal cases of cancer of the fundus. Carcinoma of the cervix, while it extends early to contiguous structures, also is usually limited to the pelvis, its extension to the bladder, as one would expect, being of the most frequent occurrence. Very few cases of carcinoma of the vagina due to recurrence from the uterus or cervix are reported in the literature. In our own series we have one case of carcinoma of the vagina following a hysterectomy for a fibroid tumor, the only case we have noted. Hoffmann, in a limited number of cases, has made an interesting study of the relation of a primary carcinoma in the uterus to the development of cancer in other parts as also of the relation of carcinoma of the uterus to primary growths elsewhere.

TABLE II—HOFFMAN

PRIMARY SEAT OF GROWTH IN UTERUS IN RELATION TO CANCERS OF OTHER PARTS

Cancer of bladder	out of 18 in women	1
Cancer of breast	" " 314	1
Cancer of intestines	" " 166 " "	9
Cancer of liver	" " 184 " "	4
Cancer of ovaries	" " 21 " "	1
Cancer of peritoneum	" " 6 (pelvic organs)	1
Cancer of rectum	" " 48	1
Cancer of stomach	" " 326	3
Cancer of vagina	" " 11	2

UTERUS INVOLVED IN PRIMARY GROWTHS ELSEWHERE

Bladder	out of 18	2
Breast	" " 314	1
External organs	" " 16 (pelvic organs)	1
Intestines	" " 166	4
Liver	" " 184	1
Ovaries	" " 21	1
Stomach	" " 326	3
Vagina	" " 11	2

Treatment.—In our judgment, in any patient past the menopause who has either a continuous or intermittent uterine discharge of any character, complete hysterectomy should be performed without delay and without hesitancy. We are told by some writers that uterine discharge is significant only when it is fetid and mixed with blood, but we do not believe that the character of the discharge should delay our treatment if the childbearing period is past. We urge strongly against curettage in these cases, as, if cancer is present, it will tend to disperse and disseminate the cancer cells. In these cases vaginal hysterectomy is performed and this can be done readily and successfully even in comparatively senile patients. A vaginal hysterectomy is performed also in a case of definite diagnosis of cancer of the fundus with the following precaution to prevent sowing the field with cancer cells,—alcohol gauze is first passed well within the cervix which is clamped off with heavy clamps.

In the case of suspected *carcinoma of the cervix* a section is first made for microscopic diagnosis. If the diagnosis was confirmed, our method in the past has been to destroy the local growth with the cautery and to pack the vagina with alcohol sponges which were left in place overnight. The following day an abdominal hysterectomy was performed with a wide dissection of the parametrium and the broad ligaments, an iodoform drain being placed well within the wound. These procedures applied to the certainly operable period, the operation being followed promptly by radium.

Because of the favorable results of radium and deep x-ray therapy in inoperable cases and the indications of its value in all stages of carcinoma of the cervix, we are, at present, not using surgery in any of these cases. We are, however, holding our final judgment in abeyance until a sufficient time shall have elapsed for a definite comparison of the three- and five-year results of radiation in early cases to be made. Fundus carcinoma is still treated surgically—except those in which metastases involve areas beyond the field of operation. These cases are treated by radium and deep x-rays.

Surgery vs. Radium and X-ray.—As to the comparison of the operative mortality and the length of life after operation combined with radium, with the results of radium treatment alone, few final statistics of value have thus far been published since the majority of reporters give results in but limited series of cases for longer periods, the periods in the majority of the reports extending over two or three years only.

Bumm reports 78 cases treated by radiation in 1913, 77 in 1914, and 127 in 1915. From this large experience he recommends operation in all cases of cancer of the cervix or fundus, in which the condition of the patient permits. This is in marked contradistinction to the judgment of J. G. Clark who reports the extreme opposite opinion

that radiation is always the method of choice in the treatment of carcinoma of the cervix, an opinion apparently shared by the Mayo Clinic as indicated in a communication by Dr. W. J. Mayo to Dr. Skeel: "The Wertheim type of operation has today only a very small field of usefulness. Personally, I have not done one in three years. Radium is taking the place of the extensive operation for the cure of carcinoma of the cervix with the exception of very early cases and it is possible that it will soon be the method of choice in all cases, either alone or combined with operation. For carcinoma of the body of the uterus, total hysterectomy is the operation of choice."

Schmitz' figures are shown in Table III.

TABLE III—SCHMITZ
APPARENT CURES FROM RADIUM TREATMENT FOR 2, 3 AND 5 YEAR PERIODS

	OPERABLE	BORDERLINE	INOPERABLE	RECURRENT
1914-1919 inc.	71.4%	54.5%	27.9%	2.2%
1914-1918 inc.	60.0%	55.6%	21.7%	0.0%
1914-1916 inc.	66.6%	40.0%	0.0%	0.0%

The principal objections urged against the radical operation are the postoperative sequelae, as well as the high mortality and the limited number of five-year survivals. Among the sequelae should be especially noted, cystitis, peritonitis, and fistulae of various types. Since some of these sequelae result also from the use of radium in inexperienced hands, since we are by no means as yet assured of a radical cure by the means of radium alone, since without operation the suffering of the patient with carcinoma of the fundus is progressive and the outcome certain, it would seem that since surgery in combination with the postoperative employment of radium and x-ray gives the assurance of saving a large majority of the patients who present themselves in the operative stage, and of palliating suffering and prolonging the life with a fair prospect of ultimate cure in doubtful cases, we should hesitate to abandon such certainties for the uncertainties still presented by the use of radium and the x-ray without surgery in cases of carcinoma of the fundus, and should consider the advisability of abandoning surgery in cases of carcinoma of the cervix as still *sub judice*.

Our own operative mortality following radical operation alone, or followed by radium, has been 6.7 per cent in 60 radical operations for carcinoma of the cervix, 8.6 per cent in 70 radical operations for carcinoma of the fundus. Lincoln Davis gives a mortality rate of 9.3 per cent for radical operations for carcinoma of the cervix. Mortality rates published by other operators vary from 6 to 18 per cent, the latter figure being given by Janeway's figures for the Wertheim operation.

TABLE IV
VARIOUS STATISTICS REGARDING OPERATION AND OPERATIVE MORTALITY
OF CARCINOMA OF CERVIX

	OPERATIVE MORTALITY	5 YEAR SURVIVALS
Cullen	15.1%	
Lincoln Davis	9.3%	40%
Graves	5.0%	
Janeway (Collected Statistics)	18.23%	19.34%
Cobb	11.16%	57%
Crile	6.7%	33.3%

As stated above, no ultimate value can be placed upon these figures without a knowledge of the extent of involvement, that is, the operative judgment as to the operability of the individual case.

SUMMARY

Our own standpoint at the present moment may be summarized as follows:

1. In any cases of abnormality in uterine function within the child-bearing period, meticulous care to determine the cause of the abnormality.

2. In the case of any abnormal discharge after the menopause, immediate vaginal hysterectomy followed by the application of radium.

3. Radium and x-ray therapy in the treatment of all cases of carcinoma of the cervix, final judgment as to the abandonment of surgery in these cases being reserved.

4. Individualization of each patient; that is, certain cases of carcinoma of the fundus which are apparently inoperable may become operable after a period of rest and the application of selected therapeutic measures.

5. Extensive correlation of the experience of individual observers is essential to the establishment of a correct basis of judgment as to the relative merits of surgery, radium and of the x-ray in the treatment of carcinoma of the uterus—whether of the fundus or of the cervix.

Euclid at NINETY-THIRD STREET.

(For discussion, see page 611.)

RADIATION THERAPY OF CANCER OF THE UTERUS*

BY URSUS V. PORTMANN, M.D., CLEVELAND, OHIO

(From the Cleveland Clinic)

THE treatment of cancer of the uterus and of cancer of the cervix has always presented a difficult problem. The observation that x-rays and radium rays have a more destructive effect upon malignant cells than upon normal tissue induced surgeons to the limited use of radiation therapy in the treatment of cancer of these tissues. Thus, the earlier era of purely operative treatment was followed by a period in which surgery was supplemented by the application of x-rays either before or after operation. During this period no better results were obtained than by surgery alone, because the x-ray treatment was purely empirical, that is, it was not based upon a knowledge of the physics of radiation nor was the dosage determined. During the last ten years the favorable results obtained by radium therapy, especially in the treatment of carcinoma of the cervix has tended to limit the surgical field to the treatment of early involvement of the cervix and to carcinoma of the fundus. However, the most favorable reaction to radium therapy and to surgery depends upon the extent of the malignant involvement. A therapeutic dose of radiation can be administered by radium to areas beyond the reach of the knife or the cautery, but there is a very large group of cases in which the involvement extends beyond the radius of radium activity and therefore, since in any given case the exact extent of the involvement cannot be known, the effects of surgery or of the application of radium cannot be exactly predetermined. These limitations of surgery and of radium therapy are met, in part at least, by the recent development of deep x-ray therapy which has provided another method of attacking malignant diseases within the pelvis, the extent of which may lie beyond the reach of operative procedures or of radium activity.

Radium rays and x-rays are identical in character, except that radium produces a small quantity of short waves of greater penetration than that of any rays yet produced by mechanical means. On the other hand, x-rays of sufficient penetration can be produced in larger quantities than can be secured from usually available amounts of radium. In view of these facts and the fact that x-rays and radium rays are governed by the same physical laws and produce identical biologic effects, it follows that they may be used to supplement each other,

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1922.

radium being used for intense local effects and the deeply penetrating x-rays of short wave lengths for broad diffuse effects.

The reaction of different types of cells to radiation varies considerably, some being highly susceptible and others very resistant. As a rule, cells undergoing rapid division are most susceptible. The endothelial cells of end-artries and lymphatics are easily affected by radiation and the resultant swelling and death cause an obliteration of the vessel channels, thus cutting off nutrition and causing the death of tissue. Among tumor cells the rapidly growing types, such as those of small cell sarcoma, basal cell and embryonal carcinoma are especially susceptible. However, tumor cells of the same type often vary in their reaction to radiation under apparently similar conditions.

The therapeutic effect of radiation is thought to be produced primarily by direct action upon the tumor cells though secondary effects, as noted above, are the obliteration of vessels and probable stimulation of local resistance to the inroads of the disease by temporary round cell infiltration.

When x-rays are passed through gases the phenomena called ionization takes place, that is, the electrochemical relationship of the atom is changed. It is logical to assume that irradiation of living cells causes an exactly similar action, i. e., an electrochemical unbalance which is incompatible with the life of the cell. Dr. Crile and Dr. Fricke have found that irradiation causes a change in the electric conductivity of the blood. This has given encouragement for future investigation of the theory of the action of the short wave lengths produced by x-rays and by radium.

In view of the present status of our knowledge of the relative limitations of surgery, radium and the x-rays, we feel that the proper treatment of malignant disease consists not in the use of any one of these agencies but rather in the employment of certain combinations of methods according to the indications in each individual case. The limitations of surgery have been quite definitely proved by years of perfected technic. Radiation therapy is in its infancy, and as yet there are insufficient comparative data. I think that most surgeons now concede that radium therapy is the preferred method of attacking cervical carcinoma, although there is a small group of very early cases that may be successfully treated by operation. Even these, however, are as effectively and more easily treated by radium. During the last eighteen months our surgeons have practically abandoned the surgical treatment of cervical carcinoma. Now with the advent of deep therapy with x-rays we believe that we have a weapon which will not only prove as useful as, but broader in its application than radium.

When the use of short wave length x-rays was advocated we began a study of the physics of the problem with our Department of Bio-Physics. Our experiments soon proved that the very large intensities of x-rays

at deep locations as measured by early workers, actually could not be obtained by practical methods of application. By careful comparison and checking, our results and conclusions which will soon be published by Dr. Fricke, have been proved to be accurate. As a result of our experiments we were of the opinion that by x-ray alone we would be unable to obtain sufficient intensities of radiation to carry a therapeutic dose into the most deeply situated lesions such as a carcinoma of the uterus. It was probably fortunate for a possible series of cases that we made no attempt to use deep x-ray therapy alone, but proceeded at once to continue the local use of radium augmenting this with the application of deep x-rays.

There is no biologic standard for the measurement of radiation. Therefore, we assume a 100 per cent dose to be that amount of radiation necessary to develop a mild erythema of the skin within three or four weeks, and then compare the reaction of tumor cells to this reaction of skin. It was first suggested that a carcinoma dose was comparatively 130 per cent of the erythema dose. In the application of x-rays we fall just short of this because we are able to administer only from 80 to 100 per cent of the erythema dose to deep lesions. Therefore, to build up a homogeneous therapeutic dose in a uterus we use radium in the cervix, the activity of which gives approximately a 30 per cent homogeneous dose at a distance of about 4 cm. from the source. Thus, by combining the intensity of radiation from radium with that from deep x-rays there is built up a therapeutic dose that in a case of carcinoma of the uterus theoretically must eliminate all malignancy from the pelvic tissue.

Fortunately the uterus is one of the easiest organs to radiate. It is centrally located in the pelvis so that x-ray radiation can be applied through a number of portals around the body. The cervical canal lends itself to the local implantation of radium without any operative procedure other than some dilatation under nitrous oxid anesthesia.

The x-ray dosage that can be administered to a deep lesion depends upon the rate of absorption of the rays as they pass through the intervening tissues, and also upon the amount that the skin can stand without permanent injury. The ratio of absorption of rays is determined experimentally and charted. By means of these charts we are able quickly to determine the intensity of radiation at any depth below the surface. If the skin is given its maximum or 100 per cent dose over a certain area, then we find that at a depth of 10 cm. there may remain a dose of only 36 per cent, the rest of the rays having been absorbed. By using predetermined physical factors of voltage, current, distance, filter and time and by applying a skin dose to a number of different skin areas or portals of entry and directing our radiation toward the site of the lesion as a focus, we find that we can build up an 80 to 100 per cent dose. A radium absorption curve may now be superimposed

upon the x-ray chart and from this we can find the intensity of radiation that reaches each point from the radium. By the summation of the x-ray intensities and the radium intensities we determine the total dose of radiation that is administered to a lesion and at any point in the surrounding tissues.

I believe that the treatment of carcinoma of the cervix will become entirely confined to radiation therapy. Radium has already proved its value. Surgery and radium are equally successful in a small group of cases of early involvement. In a second group with vaginal involvement the operative procedure becomes more complicated and hazardous, and although good results are secured they are equalled or bettered by radium. A third group in which there is some involvement of the parametrium and a fourth in which the disease is widespread, the surgeon classifies as inoperable. These last two groups include an average of 62 per cent of all cases of carcinoma of the uterus. In cases of this type radium therapy has proved to be no less successful than surgery, and as the technique of radium application is being improved progressively better results are reported. It is particularly in the treatment of cases of groups III and IV that intensive radiation by radium and x-rays perhaps proves of greatest value as compared with surgery.

In making a comparative study of the results of radiation and of surgery it must always be borne in mind that the surgeons who first see these cases determine their operability. It is only within recent years, and even now only by a few surgeons, that any but inoperable cases have been treated by radiation alone.

As for carcinoma of the fundus, heretofore its treatment has been almost exclusively surgical because of the later metastases and the ease of approach to the lesion. In Dr. Crile's series 26.8 per cent survive five years. While it is doubtful whether radiologists can improve upon the results obtained by surgeons, nevertheless, the fundus is just as accessible to radiation as is the cervix, and fortunately the predominating types of carcinoma found there yield well to radiation. It may be, therefore, that accumulating statistics of the end-results in inoperable cases in which radiation has been employed may prove that in the treatment of carcinoma of the fundus, as in the carcinoma of the cervix, the application of radium and of the x-rays is the method of choice.

At this early date we have not sufficient data from which to compile statistics of the end-results of the treatment of carcinoma of the cervix by x-ray radiation. Experience thus far, however, leads us to believe that by the combination of radium and short wave x-rays patients have been distinctly benefited more than by previous therapeutic methods. We have not refused to treat any case. We have observed the immediate cessation of hemorrhage and pain, more rapid healing of local lesions, early softening and disappearance of induration and a more

rapid convalescence than by other methods. Improvement has naturally been particularly striking in some cases with extensive involvement.

The cases in which radiation has been least successful have been those in which some operative procedure has preceded irradiation. In cases of cervical carcinoma, if cauterization is performed, it should be followed by irradiation immediately. Except for diagnostic purposes curettement and excision of tissue should not be done unless radiation is administered at the same time.

The sequelae of radiation therapy are not severe. It is followed immediately by nausea which lasts for a few hours or days and diarrhea ensues in about ten days, lasting from four to five days. An erythema of the skin which should not be troublesome develops in three or four weeks.

The most important contraindication to radiation therapy is inflammation. In some cases of carcinoma of the cervix there is an inflammation of the adnexa. It is extremely hazardous to give intensive radiation in such cases as a fatal peritonitis may develop. A bad general physical condition or severe systemic disease may contraindicate irradiation, but if we proceed slowly or give a blood transfusion there should be no difficulty. Loss of blood or anemia is not essentially a contraindication as radiation quickly shortens the coagulation time of blood and transfusion can support a patient who is too anemic. Radiation does temporarily reduce the number of red cells, but we have as yet had no case in which this was a permanent or detrimental effect.

EUCLID AT NINETY-THIRD STREET.

(*For discussion, see page 611.*)

THE ROLE OF RADIUM IN THE TREATMENT OF CARCINOMA OF THE UTERUS*

By THOMAS E. JONES, M.D., CLEVELAND, OHIO

(From the Cleveland Clinic)

VARIOUS phases of the vital problem indicated by the subject of this symposium are discussed in the papers offered by Dr. Portmann and Dr. Crile. I shall therefore confine myself to a brief statement of our personal experience with radium therapy.

Carcinoma of the Cervix.—The cases of carcinoma of the cervix which have been subjected to radium therapy during the past four years can be roughly classified into three groups:

- I Inoperable cases treated with radium alone.
- II Cases subjected to treatment with both surgery and radium.
- III Cases treated with both radium and deep x-ray therapy.

In the treatment of the cases in group I—the inoperable cases—radium therapy yields excellent results. At first we were unwilling to treat early cases of uterine carcinoma with radium, but secured excellent results in the treatment of the inoperable cases. Thus, among nine cases treated over three years ago, four cases—45 per cent—are now apparently well. Even should any of these cases die during this year they have been able to live in comfort and their economic status has been assured for at least 5 per cent of the normal term of life—during the period in which a mother is an important factor in family affairs.

In the second group,—treated by both surgery and radium,—very bad results were secured and this combined treatment has been discarded.

The third group, in the treatment of which both radium and deep x-ray therapy have been used, shows the best results, although since this combined method of treatment has been in use less than a year we have no available statistics upon which to base a discussion of end-results—three or five year cures.

Method of Treatment.—The method of application of radium changes from time to time with increasing experience and with individual cases, for it is impossible to treat all cases alike. Often it is feasible to use needles, while in other cases their use is not possible. I think,

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1920.

however, that needles should be inserted wherever possible because by their use a more homogeneous radiation is secured.

It has been our custom to place 75 mg. in the cervix screened with 1 mm. of brass, 50 mg. against the cervix and 75 mg. (in 9 needles) inserted at various points in the cervix, the treatment being continued for periods varying from 12 to 16 hours. In from three to four weeks the patient is treated again by placing 125 mg. screened with 1 mm. of brass against the cervix for from 12 to 15 hours. Thus, each case receives a total dosage varying from 4000 to 4800 mg. hours. After the second treatment the patient is discharged, but comes in again for observation three months later.

Nausea is the one complicating factor to be considered. This is not invariable as some patients are nauseated and others are not. We have found no means of obviating this condition. There is no foundation for the popular use of alkalis. That there is no acidosis is shown by the fact that the potential alkalinity of the blood is increased after radiation.

We have not seen a single fistula, either rectal or vesical, in the cases treated with radium alone. They have occurred only in the cases treated with both surgery and radium. Proctitis with a slight stricture has occurred in only one case.

It should be borne in mind that in discussing the relative merits of surgery and of radiation in the treatment of carcinoma of the cervix the basis of comparison must be the morbidity and the end-results,—three and five year “cures”—as immediate mortality in these cases pertains only to surgery. No immediate mortality can be attributed to radium therapy. We are convinced of the value of radium in inoperable cases of carcinoma of the cervix; we believe that accumulating evidence will give equally positive evidence of its value in early cases.

Carcinoma of the Fundus.—On account of the excellent results of the surgical treatment of carcinoma of the fundus, up to the present time I have not advocated radiation in these cases. During the past year, however, in three cases we have seen a recurrence in the upper end of the vagina six months after a complete hysterectomy, and all three of these patients died less than one year after operation. This fact suggests that further investigation is demanded—perhaps a trial in cases of carcinoma of the fundus, in which there may be some contra-indication to operation, such as old age, or cardiovascular disease, or objection to operation on the part of the patient.

RECEIVED AT NINETY THIRD STREET.

(For discussion, see page 611.)

RELATIVE VALUES OF IRRADIATION AND RADICAL HYSTERECTOMY FOR CANCER OF THE CERVIX*

BY JOHN G. CLARK, M.D., AND FRANK B. BLOCK, M.D.,
PHILADELPHIA, PA.

SURGICAL statistics the world over demonstrate the fact that there is scarcely an anatomic situation which offers a more discouraging outlook for operative intervention than cancer of the cervix. It is not, therefore, surprising that many excellent surgeons have largely side-tracked the radical abdominal operation in favor of irradiation, since the low percentage of operability and the high rate of mortality have not proved a very alluring field for such a strenuous endeavor. In our own hands, in the Gynecologic Department of the University Hospital, notwithstanding the most assiduous endeavor, we were never able to achieve a salvage of more than 33 per cent of five-year cures, in a relatively small number of operable cases, which had been culled from a much larger group of hopeless cases. Several reports from other sources have demonstrated a higher percentage of curability, while some have dropped below this point. It was not difficult, therefore, to "swap horses" when the surgical race had been so poorly run by the first nag, and the second offered a hope for at least as good if not a better issue.

In our initial employment of radium, we proceeded with great caution, applying it only in hopelessly inoperable cases, but when this agent began to yield such startling palliative results, we widened its scope of administration to the zone of borderline cases, acting on the principle that irradiation, which is accompanied with almost no mortality, would work quite as effectively as a hazardous operation with its large percentage of rapid recurrences and infrequent cures. Again, after advancing our standard the results did not cast discredit upon this innovation, and for the last three years the choice of a radical operation has been limited to the absolutely favorable type, and they have been so few in comparison with the number of hopeless and borderline cases as to be almost negligible. It has been our endeavor to maintain as judicial an equilibrium as possible, not too hastily abandoning the old and not too unreservedly taking on this newer therapeutic method. After all, as our experience has taught, and statistical reviews fully confirm, there is no accurate or scientific method of determining the exact extent of any cancerous process, for not only does operability vary remarkably among surgeons of the

*Read at a meeting of the Philadelphia Obstetrical Society, November 1, 1922.

highest merit, but even in one's individual experience, this instability is noted. What we might define as a borderline case at one time may be classed as inoperable at another.

There really is but one way of classifying cures in cancer, and that is, upon an actual basis of gross numbers. The question is, how many cases of cancer have you seen, and how many have you cured? Were the physician to attempt to define what is a curable, a borderline, or an incurable case of pneumonia, typhoid fever, or any of the numerous diseases which he encounters, he would hopelessly muddle statistics, and we are persuaded after a perusal of many articles on cancer, based upon this differential standpoint, that the results are glaringly chaotic. To put this matter in a nutshell, all cases of cancer recorded in our clinics should be included as a whole and not subdivided into classifications so subject to the large factor of human mutability. How better may one confirm this observation than by pointing to the accompanying compilation of the surgical results of ten skillful specialists? Thus Peterson in 380 cases considered only 15.7 per cent as operable whereas Graves in a series of 189 cases, operated upon 65 per cent. If such a wide difference occurs in the hands of two men of special skill, what may one expect from the surgical world at large? As we view this situation, we consider such an attempt to define surgical limits as practically useless. As an example of exaggerated caution, a writer has recently defined the curable case of cancer of the cervix as one which can only be recognized microscopically. This refinement of selection would essentially reduce operability to a vanishing point, and of course is the view of a surgical pessimist. The point which we wish to make is that mass statistics rather than differential values are, in the final run, the only safe basis upon which to rest our estimate of curability. Furthermore, the surgical mortality following the radical operation is even of wider variability, for in the accompanying table, the lowest mortality recorded is 5 per cent, whereas the highest is 26.6 per cent. Also, what one surgeon designates as a radical abdominal operation when compared with the extensive dissection of another surgeon might quite properly be classified as a simple panhysterectomy. And so goes the fallacy of statistics which are built upon such shifting sands.

The object of our paper is to compare surgical and irradiation statistics viewed from the standpoint of cures, and the mortality attributable to therapeutic intervention. In Table II the most recent results of radical operations from ten excellent clinics are epitomized, and a mere glance at these columns sets forth the ever intrusive human equation. Thus Martzloff's report from the Gynecologic Clinic of the Johns Hopkins Hospital shows a 14.2 per cent mortality and only a 26.6 per cent salvage—a poor exhibit in comparison with many other

reports. Knowing the method followed in compiling these statistics, we are confident, however, that none can be more strictly fair or more accurate. For instance, there has been a change of viewpoint in recent years among pathologists as to what constitutes malignancy in certain questionable changes. Taking into account this fact, Martzloff first reviewed the original microscopic slides of all cases diagnosed as cancer in the gynecologic laboratory, and chose only those which were unqualifiedly malignant, discarding all questionable cases, and still others which a decade ago were designated as malignant, but which are today otherwise classified. Upon this scientific diagnostic basis his clinical structure was erected. Just as the personal equation varies both in the perfection of surgical skill and judgment, so likewise may the ability and accuracy of the pathologist be measured. It has been our experience that even the best general pathologist is inclined often to pronounce glandular changes in the cervix as malignant, while another specializing in gynecologic microscopy will unhesitatingly take a benign view of the same case. This element of error is strikingly illustrated in a decision as to what constitutes a deciduoma malignum. Thus into all statistical reports in which there is a close microscopic question as to malignancy, an error may be introduced, which always favors a larger percentage of cures. For fear of dooming a patient because of an error of judgment, not infrequently the pathologist, when in this dilemma, acts upon the principle, when in doubt classify the specimen as cancer. For this reason we call especial attention to Martzloff's report, because there has been such a rigid sifting out of all questionable microscopic material. In the study of Table II, the widely varying viewpoints as to operability and the great divergencies between the surgical mortality and the five-year cures of several reporters is so vividly evident as to require no further comment. Such wide discrepancies in results can scarcely occur in any other domain of surgical endeavor.

STATISTICS ON TREATMENT OF CERVICAL CANCER

The Radical Abdominal Operation.—About ten years ago Jacobson compiled statistics on this subject. At a later date his work was included in the statistics of Janeway published in 1919 (*Surg., Gyn., and Obst.*, 1919, xxix, 242). The latest collected statistics are those of Duncan (*Jour. Am. Med. Assn.*, 1921, lxxvii, 604), which include Janeway's work (Table I).

A review of the literature for the past three years by Skeel (*AM. JOUR. OBST. AND GYNEC.*, 1922, iii, 252) demonstrates the obvious fact that the mortality rate declines with experience. He estimates that of every 100 cases of cervical cancer applying for treatment only 50 are operable. On an average, there will be a primary mortality of

TABLE I
CASES CURED FOR FIVE-YEAR PERIOD

	NUMBER OF CASES	OPERA- BILITY	PRIMARY MORTALITY	OF CASES TRACED	OF CASES OPERATED UPON	OF CASES APPLYING FOR TREATMENT
Carcinoma of Cervix						
Abdominal Operation	5027	1720	1090			
Percentage		34.21	18.23	35.41	19.32	11.72
Carcinoma of Cervix						
Vaginal Operation	1205	654	192			
Percentage		58.1	9.35	29.67	17.74	9.62

five (10 per cent), recurrences in 25 (50 per cent), five-year cures in 20 (40 per cent), while 50 will die without operation. He believes a radical operation lacks justification with such results if any other less hazardous measure offers an equivalent. Judged by this very fair standard, we have compiled the recent statistics from ten surgical clinics, and a glance at Table II will show how remarkably accurate is Skeel's estimate.

TABLE II
RADICAL OPERATION FOR CARCINOMA OF CERVIX

NAME OF REPORTER	JOURNAL	TOTAL APPLY- ING	OPERA- BILITY PER CENT	NUMBER OPER- ATIONS	PRIMARY MORTALITY	5-YEAR CURES
Martziloff	Bull. Johns Hopkins Hosp., 1923, xxiv, 141.	387	46 %	178	14.2%	26.6%
Mayer	Zentralbl. f. Gynäk., 1920, xlv, 617.	725	65.3%	457	20.3%	39.3%
Colb	Jour. Am. Med. Assn., 1920, lxxiv, 14.			35	14.3%	57.1%
Graves	Surg. Gynec. and Obst., 1921, xxxii, 504.	189	64 %	119	5.0%	34.2%
Bonney	Brit. Med. Jour., 1921, ii, 1103.			100	20.0%	42.3%
Peterson	N. Y. State Jour. Med., 1920, xx, 313.	380	15.7%	60	26.6%	40.9%
Schweitzer	Zentralbl. f. Gynäk., 1921, xlv, 289.	443	40.0%	177	6.78%	51.4%
Davis	Ann. Surg., 1922, lxxvi, 395.	85	37.6%	32	9.3%	40.0%
Giesecke	Arch. f. Gynäk., 1922, cxv, 435.	371	70.6%	224	19.6%	33.5%
Bumm	Zentralbl. f. Gynäk., 1919, xlv, pt. 1, 1.			157		49.0%

The ratio of operability varies from 15.7 per cent to 70.6 per cent, but the oft repeated statement that low operability means high percentage of cures does not invariably hold since Peterson has the lowest operability (15.7 per cent), but his percentage of cures (40.9 per cent) is about the average, as stated by Skeel. Furthermore, his primary mortality is highest (26.6 per cent), which would indicate that

he performs a very extensive operation. In the entire series, the primary mortality varies from 5 to 26.6 per cent. Totalling the statistics we find that in 1539 abdominal operations, there were 608 five-year cures, or 39.5 per cent curability. This then represents the present curability of cervical cancer in the hands of the most experienced surgeons throughout the world. The percentage of cures is slightly higher and the primary mortality is a bit lower than Janeway found a few years ago.

In the compilation of statistics on radiotherapy of cervical cancer, for purpose of comparison, we encounter some difficulty. While radium is widely used, and there is much literature upon this subject, there are but few reports which deal with five-year cures—not because they do not occur, but because this innovation is yet in its infancy. Heyman reports 26 cases, 85 per cent of them inoperable, and seven, or 29 per cent, have been cured over five years. We have taken from Bailey and Healy's report, not yet published, only the cases treated by their new technic in the Memorial Hospital of New York, which have passed the five-year test. These surgeons have had available for use maximum amounts of radium. In this Table, there are 160 operable cases treated by radium five years or more ago with 69 or 43.1 per cent cures. Of the inoperable cases, there were 418 subjected to irradiation with 38 or 9 per cent five-year cures.

TABLE III
RADIOTHERAPY IN CARCINOMA OF CERVIX

		OPERABLE	BORDERLINE	INOPERABLE	RECURRENT INOPERABLE
Burnam	N. Y. State Jour. Med., 1920, xx, 316.	50%	31%	9 %	11%
Flatou*	Zentralbl. f. Gynäk., 1923, xix, 737.	50%		9.5%	
Bailey and Healy	Jour. Am. Med. Assn., 1923, lxxxi, 65.	27%	24%	14.5%	22%
Schmitz	Northwest Med., 1923, xxii, 77.	42.85%		6.3%	
Burns	Zentralbl. f. Gynäk., 1919, xlv, pt. 1, 1.				
	Series 1913	28.5%	23%	4.7%	
	" 1914	20.0%	19%	5.5%	
	" 1915	55.0%	39%	10 %*	

*Denotes all cases not over five years.

This analysis of cases recorded in medical literature shows that in general, radium gives a curability of 43 per cent as against 39.5 per cent obtained by radical operation in cervical cancer. Further, the 9 per cent inoperable cases that were cured would all have died under any other treatment.

From Table III it will be seen that the treatment of cancer of the cervix by irradiation has stood a very fair test in comparison with

the radical operation. Our own statistics, which are fully up to date at this time, do not, however, show such good results as those set forth in most of these reports, and are not so favorable as we anticipate the next five-year report may be. In our series, there were 22 operable cases with 27.2 per cent cures; in the inoperable cases, there were 6.7 per cent surviving and free from evident recurrence at the end of five years. In our total of 144 cases only 15 per cent of which were operable, 10.4 per cent safely passed the quinquennial test. During the last four or five years, we have always irradiated under gas anesthesia, which has rendered the treatment in the latter group more effective, but this series has not yet passed the quinquennial test. However, a full trial has been made by us of both the radical operation and the treatment with a moderate dosage of irradiation (100 milligrams of radium for 24 hours) repeated at later intervals once or at most twice, if necessary, and we are convinced that while the latter method has been of immeasurable help in the relief of the inoperable and has effected a cure in a small percentage of those otherwise doomed, nevertheless, it falls far short of an ideal remedy but compares most favorably with the radical operation. As we have stated in previous paragraphs a series of radical operations reported from the Gynecological Clinic of the University Hospital in 1913, yielded only a 33 per cent curability with an 8 per cent incidental mortality. In 22 cases treated by radium with no primary mortality, 27.2 per cent passed the five-year period. When we add a 6.7 per cent of five-year cures in the inoperable class it will be seen that the results are practically equivalent to those obtained by the radical operation. On the other hand, in estimating the relative values of these two plans of treatment on a basis of hospital economics, the efficiency of the two classes of patients immediately after treatment, the checking of distressing symptoms, and the reduction of morbidity, the argument is manifestly in favor of the irradiation series. However, the distressing fact is still quite evident that while irradiation is of inestimable value as a therapeutic agent and removes from the surgical domain the great majority of cases of cancer of the cervix, we are not as yet in sight of a real and efficient remedy for this disease in by far the overwhelming majority of cases.

We have classed as operable those cases in which the disease had not extended beyond the cervix or the body of the uterus. The inoperable cases were those in which the disease had extended into the broad ligaments, vagina, had invaded the vesical or rectal walls, or had metastasized to remote glands. Also, under this head were placed all cases the records of which did not show in accurate detail the extent of the growth.

As to the relief of symptoms, we find the results about the same as

TABLE IV

RADIUM TREATMENT OF CARCINOMA OF CERVIX. CASES APPLYING FOR TREATMENT IN THE GYNECOLOGIC DEPARTMENT OF THE UNIVERSITY HOSPITAL BETWEEN JANUARY 1, 1914 AND JANUARY 1, 1919
(Compiled by Dr. Robert Kimbrough)

TOTAL NO. CASES	OPERABLE (22 CASES) 5-YEAR CURES	INOPERABLE (118 CASES) 5-YEAR CURES	RECURRENT INOPERABLE (4 CASES) 5- YEAR CURES	TOTAL 5- YEAR CURES
144	27.2%	6.7%	25%	10.4%

reported in previous papers on this subject issued from the Gynecological Department of the University Hospital. In conclusion, we again reiterate our oft repeated statement that radium is a palliative remedy of inestimable value in the great majority of hopeless surgical cases and of absolute curative value in a small percentage. While it challenges most favorable comparison with the radical abdominal operation, nevertheless, we take no issue with the skillful specialist who still adheres to the radical viewpoint, provided he supplements his operation with postoperative irradiation. As to anteoperative irradiation, we are still doubtful, and await with interest the report from those clinics in which this prophylactic plan is employed. To discard or fail to use this newer remedy as an adjunct to surgical measures in the face of such statistics as are now available should lay the objector open to a charge of serious negligence.

2017 WALNUT STREET.

(For discussion, see page 625.)

CARCINOMA OF THE BODY OF THE UTERUS (WITH THE REPORT OF 115 CASES)*

BY CHARLES C. NORRIS, M.D., AND M. E. VOGT, M.D.,
PHILADELPHIA, PA.

WITH the advent of radium, the study of carcinoma has received a great stimulus, and perhaps in no variety greater than that which occurs in the uterus. Probably owing to the unsatisfactory results secured by operative intervention and probably also to the greater frequency of the neoplasm, this interest has been rather centered about cervical cancer. The following study embodies the results obtained by operation and irradiation in a series of 115 consecutive carcinomata of the body of the uterus, especially emphasizing the end-results.

Carcinoma of the uterus may be divided into that form which originates in the cervix and that which springs from the fundus. These are different tumors, histologically and clinically, and a definite line should be drawn between them. Carcinoma of the fundus is less common than that of the cervix. Among 12,514 gynecologic patients observed during the last 23 years at the University Hospital, there have been 115 cases of fundal carcinoma. During a like period 346 cases of cervical carcinoma have been observed among 756 cases of carcinoma of the genital tract. Thus in our series, carcinoma of the fundus constituted about 15.2 per cent of all cancers of the genital tract and about 25 per cent of all uterine cancers. Frank¹ places the former figure between 10 to 15 per cent; Peterson² 18.8 per cent; and Wilson³ 11.2 per cent.

It is an established fact that chronic irritation is a distinct predisposing factor towards cancer. Cervicitis, especially in cervices which have been the seat of laceration, is extremely frequent, whereas true chronic corporeal endometritis is infrequent, and if we exclude the tuberculous type, quite rare. It is probable that these facts have a definite bearing on the greater frequency of fundal than of cervical carcinoma. The combination of genital tuberculosis and carcinoma has been recorded by a number of observers (Norris,⁴ D'Halluin and Dalhal⁵).

Carcinoma of the fundus is generally a disease of advanced life occurring on an average somewhat later than carcinoma of the cervix. The following presents the age in decades in our series:

*Read before the Philadelphia Obstetrical Society, November 1, 1922.

20-30	1 case	(29 years of age)
31-40	14 cases	
41-50	18 "	
51-60	57 "	
61-70	21 "	
71-80	4 "	

The average age in this series was 53.29 years; 100 of the 115 cases or 86.9 per cent were 41 years of age or over, and 82 or 71.3 per cent were 51 years or older, the greatest number, 49 per cent, occurring between 51 and 60 years. Peterson states that 73.2 per cent of his patients were between 55 and 65; Koblanc⁶ 50 per cent between 50 and 60; Cullen⁷ and Wilson observed similar findings.

Carcinoma of the cervix is rare in nulliparous women, 26 per cent of carcinoma of the present series occurring in spinsters. It would appear that childbirth plays little part in the etiology of this neoplasm, and that the disease is relatively as frequent in the nulliparous as in the multiparous.

The most important symptoms are hemorrhage and discharge. The hemorrhage usually begins in the form of "spotting," generally small in amount. It may follow trauma, but this is not as constant as in cervical carcinomata; in the latter the vascular, friable cancer is from its location, less protected. The hemorrhage becomes more frequent and profuse as time goes on. This rather rapidly progressive character of the bleeding is characteristic of all malignant uterine neoplasms. Rarely until the later stages, is the amount of blood lost sufficient to produce a marked alteration in the blood picture. It should be emphasized that the bleeding produced by carcinoma of the fundus is a metrorrhagia. Menstruation, if still present, is probably in no way affected and occurs regularly and is usually of the normal duration. Occasionally a carcinomatous hemorrhage may accidentally occur a day or two before or after the normal period, and thus simulate a prolongation of the normal flow but as a rule, it is definitely intermenstrual in type.

Owing to the age at which carcinoma of the fundus usually de-

*Since compiling these statistics, we have observed a case of adenocarcinoma in a young woman, twenty years of age. The case was referred to the gynecologic ward of the University Hospital with a diagnosis of incomplete abortion. Carcinoma of the fundus was diagnosed from the curettings and hysterectomy revealed an early cancer in the fundus not more than 1.6 cm. in diameter. Despite the early stage of this tumor, a small metastasis had occurred in one ovary. This case offers an opportunity to study the rapidity of growth of adenocarcinoma. The curettage was performed September 21st, and owing to various difficulties, among them that the patient had left the city, hysterectomy was not performed until six weeks later. At the time of curettage, the tumor must have been extremely small as practically all the tissue removed was normal except a small shred a few millimeters in diameter, which showed a typical picture of carcinoma. When the uterus was removed, the tumor was easily recognizable macroscopically and measured 1.6 x 1 cm. There was little penetration of the myometrium. The neoplasm had evidently originated from the surface epithelium and was of the variety sometimes spoken of as adenomalignum. The Sampson theory of perforating cyst is applicable to this case as an explanation of why such an early specimen produced metastasis. The curettage dislodged carcinoma cells, the postoperative pain produces uterine contractions, the ovarian metastasis (or implantation) was upon the surface of the ovary and was of about the size that would be expected under the circumstances.

velops, the irregular bleeding of the cancer is often attributed to the menopause or to a recurrence of the menses. A slight amount of bleeding frequently follows straining at stool, and this is often attributed by the patient to hemorrhoids. The origin of the hemorrhage can be easily determined by instructing the patient to insert a small piece of cotton or gauze into the vagina prior to defecation and examining same shortly after the bowels have moved. The discharge is thin, irritating, often bloody and malodorous. The foul odor depends upon the amount of degeneration which has occurred on the surface of the cancer. Some authors state that discharge is usually the first symptom and this may be true. A small amount of discharge is, however, less noticeable than a small amount of bleeding and for this reason, the latter is the more important symptom.

An analysis of our case histories shows that in 81 per cent of our patients, hemorrhage was the first symptom and in the remainder, discharge was noticed prior to the bleeding. Hemorrhage, however, occurred in all at a later date, whereas in a few of our early cases, discharge while perhaps present in small quantity, probably was not noticed by the patient. In carcinoma of the fundus, hemorrhage is worth about 75 points in the diagnosis, and discharge about 25; whereas in carcinoma of the cervix, the symptom of hemorrhage is of even greater diagnostic value, probably being worth 90 points and discharge 10 points. Hemorrhage and discharge are the only subjective symptoms of much value; pain, cachexia, loss of weight, etc., generally indicate an advanced and hopeless condition.

The importance of early diagnosis cannot be overestimated. The subjective symptoms during the early stage are by no means characteristic. In our series, less than 25 per cent were early cases. A study of the present series proves that two factors stand out dominantly as reasons for the advanced stage in which most of these cases were when first observed. The first is that the lesion is painless during the early stage. Nothing will bring a patient to a physician more quickly than pain, and the absence of this symptom during the early stage of all uterine cancers, is an important and unfortunate factor. The second reason that patients are prone to disregard the early symptoms is that the menopause itself is usually irregular; probably not one woman in ten passes through this period of life without some irregular bleeding. Many women, therefore, disregard the slight irregular bleeding or slight discharge which are the only symptoms of the cancer during its early stage, under the belief that the hemorrhage is the result of the menopause and if she inquires among her friends, this opinion is almost sure to be confirmed.

The reason that this misapprehension is so firmly established in the lay mind and so difficult to eradicate, is that in 90 per cent of women

the irregularities are due to some benign condition, and as a result the belief becomes more firmly fixed. Carcinoma of the fundus often develops after the menopause and after the woman has gone through a more or less prolonged period of irregular bleeding, and under such circumstances the hemorrhage is often attributed to a return of the menstrual flow. Furthermore, carcinoma develops at a period when various minor lesions are prone to cause bleeding.

It is obvious, therefore, that the great majority of irregularities are not the result of cancer, and for this reason this danger symptom is often disregarded during the period when its observance would be of most value. The disinclination to submit to a gynecologic examination combined with the good general health often enjoyed by the patient during the early stage of cancer of the uterus, are also contributing factors in "letting the condition go for a while and seeing if they will not get well."

To the experienced physician the symptoms previously described are always suspicious, and the condition is very properly viewed as malignant until proved otherwise. This proof, however, is not always easy. The ordinary pelvic examination is generally entirely negative. In 65 per cent of our early cases, the uterus was normal in size, showing definitely that increase in size of the uterus is by no means a constant condition. The curette of course offers a practically certain means of diagnosis.

The test suggested by Dr. John G. Clark, while less certain, is of great practical value. This is applicable to all suspicious cases and may be safely employed as an office procedure. It consists in cleansing the external genitalia, vagina and cervix thoroughly with an antiseptic solution and then passing under sight a sterile sound to the fundus of the uterus and gently manipulating the point of the instrument over the entire endometrial cavity. If a friable, vascular growth such as carcinoma is present a small trickle of blood will be observed. A satisfactory means of employing this test is, after the cleansing of the vagina, to introduce a Sims speculum and partially fill the vagina with bichloride solution, 1-2000, so that the cervix is immersed in a lake of the liquid. Under sight a sterile sound is then introduced and gently raked over the entire endometrial cavity. We all know how a few drops of blood from a nose bleed will discolor a basin of water and in the same manner, a few drops of blood will be easily demonstrated in the clear solution in the vaginal lake. In employing this test, the cervix should not be grasped with a tenaculum.

As it is possible that other pathologic conditions may cause bleeding from this test, the nonappearance of blood from the cervix indicates strongly that no cancer is present. One of the writers has em-

ployed this test frequently and has never seen it fail when a carcinoma has been present. Ewing has suggested taking smears from the fundus of the uterus, and by this means has been able to demonstrate in a proportion of cases, the presence of carcinoma cells or fragments of the tumor. A combination of the Clark and Ewing tests may be easily employed and is of great practical value. Neither of these tests is conclusive in all cases, and the surgeon will have to depend upon the microscopic examination of the curettages for the final and positive diagnosis in the majority of the early cases.

Absolute asepsis is essential in the employment of either the Clark or Ewing tests. The great advantage of the Clark test is that it may be employed as an office procedure; it involves no loss of time and requires no special skill or expensive apparatus. We feel sure that if this test were more widely employed, many early cases of carcinoma would be detected which would otherwise remain unrecognized until the disease became advanced.

To the experienced physician, a tentative clinical diagnosis in a patient who has passed the menopause, and in whom there has been an absence of bleeding for some years prior to the development of the cancer, is generally easy. When symptoms develop at the time of the menopause, the clinical diagnosis is much more difficult.

In our entire series, the clinical diagnosis was correct and positive in 57 per cent of cases. Carcinoma of the fundus was suspected in an additional 23 per cent of cases, and in 19 per cent the cancer was unsuspected. An analysis of 58 cases in which a diagnostic curettage was performed, shows even more forcefully the importance of a histologic examination. In this series 36.8 per cent were correctly and positively diagnosed clinically; in an additional 37.9 per cent the malignant character was suspected, and in 25 per cent the clinical diagnosis was benign. In addition, many cases clinically suspected of being carcinoma were proved benign or a result of curettage.

Of the 20 cases in which the clinical diagnosis was benign but proved malignant, 15 were associated with myomata. Thus in 75 per cent of the unsuspected cases the symptoms of the cancer were masked by those of preexisting myomata. Myomata are the most common uterine neoplasms and their association with cancer is by no means infrequent. In our 115 cases of carcinoma, 24 were associated with myomata. In the early stages the bleeding produced by these two forms of neoplasms is generally quite distinct; the myoma producing menorrhagia, and the carcinoma metrorrhagia of the type previously described; but often in the later state of the myoma, the bleeding becomes markedly irregular and these are the cases in which error is especially likely to occur.

The association of fundal carcinoma with myomata is an interesting

one, and despite the amount of research which has been done upon the subject, it is still questionable whether or not myomata are a predisposing factor towards cancer. In the present series, carcinoma of the cervix is about three times as frequent as carcinoma of the fundus. Noble⁸ found carcinoma of the fundus more frequently than of the cervix among 5,000 myomata, in the proportion of 75 to 63. Williams⁹ found carcinoma of the fundus in 1.4 per cent of his myoma cases. Our statistics show 115 fundal carcinoma as compared with 1983 myoma, a proportion of a little more than one fundal carcinoma to every 17 myoma.

The aforementioned figures demonstrate the importance of a diagnostic curettage in all suspected cases, and also emphasizes the importance of a preliminary curettage prior to all irradiation of myomata. For the performance of a successful histologic diagnosis from curettings, it is essential that the pathologist possess a thorough knowledge of the changes which take place in the normal endometrium during the menstrual cycle at different ages, as well as the changes produced by pregnancy. He should be furnished with such data from the history of each case as are necessary. Recently a number of papers have appeared in the gynecologic literature decrying the operation of curettage as a routine procedure. This has no bearing on diagnostic curettage. Were diagnostic curettage to be eliminated from the number of justifiable operations, few early operations for fundal carcinoma would be performed and many benign lesions would be treated as malignant.

A diagnostic curettage should be a thorough one as the carcinomatous lesion may be small. Obviously, it is impossible for the pathologist to make a correct diagnosis unless he receive the tissue. It is possible to make a diagnosis of carcinoma from a very small fragment of tissue, provided this presents a typical picture; a larger quantity of material, however, greatly facilitates the laboratory diagnosis, and in a series of cases, materially increases the proportion of correct conclusions.

The accuracy with which histologic diagnosis may be made in a large series of cases has occasionally been questioned, and Deaver and Reimann¹⁰ have even gone so far as to recommend abdominal hysterotomy in suspicious cases. In the laboratory of gynecologic pathology at the University Hospital, a diagnosis of carcinoma of the fundus has never been made from curettings which, when the uterus was subsequently removed, did not confirm the histologic findings. Nor, so far as our knowledge goes, has a case which was diagnosed benign by the pathologist, ever been shown to be malignant. Some of our cases in which a diagnostic curettage has been performed and a benign diagnosis made from the histologic findings, have not been

traced and may therefore have been mistakes by the pathologist, but in view of the fact that a very thorough follow-up system is in force, even this appears doubtful. Cases can, however, be imagined where a cancer may develop in the crevice of a uterine cavity, the seat of one or more submucous myomata, in which it would be impossible for the curette to reach the carcinomatous tissue, but these must be extremely rare.

One case occurred in which a woman presented herself, having a large nodular mass in the pelvis, and who had been bleeding irregularly and profusely for a long period of time. The diagnosis was myoma of the uterus and the patient was referred for irradiation. A curettage had been performed in a neighboring city and a histologic diagnosis of polypoid endometritis made by another pathologist. This case presented all the clinical characteristics of a myoma, and on account of the poor general condition of the patient, due to her hemorrhages, it was decided to apply radium. At the time of the irradiation, a curette passed lightly over the endometrial cavity failed to secure any tissue, probably due to the fact that the former curettage had been performed but ten days previously. This patient failed to improve, sought surgical assistance elsewhere and at hysterectomy some time later, a carcinoma of the fundus was discovered. In this case, it was impossible to secure tissue on account of the former curettage.

Despite this case, we believe that accuracy in histologic diagnosis of curettings is possible in nearly 100 per cent of cases. Carcinoma of the fundus may originate upon the surface of the endometrium and, at this stage, it is theoretically possible for a curettage to remove the entire lesion. A number of cures by curettage are on record and may undoubtedly occur. Ladinsky¹¹ has collected 22 such cases; also Frank¹² and Weiner.¹³ Such instances must, however, be extremely rare. It is hardly probable that such early carcinomata would produce symptoms, and unless the curettage is performed for some other cause, it is unlikely that such cases would be observed. Specimens from such cases should be subjected to an extremely rigid pathologic examination, for the possibility of a misinterpretation of the histologic picture must be considered. It is not improbable that an endometrial polyp which was undergoing carcinomatous degeneration might be entirely removed by curettage and thus result in a permanent cure. This would be especially likely if the carcinomatous area were confined to the distal extremity of the polyp.

One of the writers (Norris¹⁴) has elsewhere drawn attention to the limits of microscopic diagnosis. Occasionally doubtful histologic pictures will be observed which will be interpreted differently by even the most experienced pathologists. As a general rule, such specimens

are usually benign. If the curettage has been a thorough one, there is rarely room for doubt in the class of cases under discussion. Was such a case to occur, it would be wise to be governed by the clinical evidence present. Certainly a second diagnostic curettage would be indicated, in any event, should there be a recurrence of symptoms. In the performance of diagnostic curettage in cases suspected of being carcinoma of the fundus, care must be observed not to perforate the uterus; this is a quite possible accident in advanced cases. (Schottländer and Kermanner¹⁵).

We have dwelt somewhat upon the question of early diagnosis because we feel that it is the key-note to the situation, and provided proper treatment is instituted, carcinoma of the fundus is generally considered a relatively hopeful form of cancer, especially when compared to carcinoma of the cervix. Many authors place the percentage of cures as high as 60 to 75 per cent. This has not been our experience. A careful study of our cases, while it shows better results than those secured in the cervical form of cancer, is by no means satisfactory. Only 44 per cent of 115 patients are alive today, and some of these are alive with recurrences and in others, recurrence will develop.

Carcinoma of the fundus is obviously a more favorable form of cancer than is the cervical variety. The cervix is surrounded by vital structure—bladder, rectum, ureters, etc.—and extension into any of these renders a favorable end-result unlikely. Because the cervix is intimately associated with adjacent structures, extension is more likely to occur and makes a wide removal more difficult. When the cancer originates in the fundus, it is surrounded by a thick muscular envelope—the myometrium; the fundus is free on both the anterior and posterior surface and the upper portions of the broad ligament are easily removable. The lymphatics of the fundus are abundant. Metastases and rapidity of growth of carcinoma of the fundus appear to vary somewhat according to the age of the patient and the type of the tumor. The duration of symptoms is about twice that of cervical cancer.

Ewing¹⁶ states that the lymphatics of the corpus begin at the endometrium, pass upwards and outwards and leave the uterus in four or five trunks just beneath the tubes, pass through the broad ligaments, anastomosing with the ovarian plexus and about the ovarian artery in the pelvic ovarian ligament, to end in the lumbar nodes above the bifurcation of the aorta; from the middle of the corpus, other vessels mingle with those from the cervix, reach the iliac nodes, parametrial, iliac, hypogastric, sacral, lumbar and inguinal, form the regional nodes of the uterus. Beyond these there is a wide communication with each other and with vessels of the bladder, rectum, kidneys and abdomen.

In many cases individual susceptibility of the patient also seems to be an important factor in the question of metastasis and rapidity of growth. Many efforts have been made to correlate the malignancy of the carcinoma with the histologic type of cancer. Practically all carcinomata of the fundus of the uterus are of the glandular type, although we have encountered one squamous-celled carcinoma in this locality in a specimen forwarded to us by Dr. John L. Atlee of Lancaster.¹⁷ Especially noteworthy in this effort, is the recent research of Mahle.¹⁸ He states that cellular differentiation appears to be the most important factor in determining the malignancy in any given case. We have carefully reviewed our specimens with this conclusion in mind, and while we agree with Mahle's statement, we have observed a number of contrary findings. Our experience has been that, as a general rule, those tumors, the cells of which exhibit a marked tendency towards mitosis, a marked tendency to break through the basement membrane, are the most rapid in growth. Such tumors are naturally surrounded by a more well-defined zone of inflammatory reaction than are more slow-growing neoplasms. This inflammatory reaction consists largely of lymphocytes. Marked irregularity in the size of the tumor cells and hyperchromatosis are also generally present in extremely malignant form of tumors.

The chief point in prognostic value is the integrity of the myometrium. In some specimens, the myometrium is hypertrophied, but this is unusual, although edema is generally present in advanced cases. The macroscopic examination offers a rough, but fairly accurate, guide to the advancement of the case, and on cut sections, it is usually possible to determine moderately accurately, the extent of the growth. In two specimens we have observed subperitoneal involvement, due to extension along the blood vessels from small tumors. Ewing has recorded a similar experience. The macroscopic appearance may be intensified by making a thin slice of tissue and flooding it with polychrome methylene blue No. 13; the tissue is then rinsed in distilled water and examined with the naked eye, and with a magnifying glass, according to the method suggested by Terry.¹⁹ As a general rule the younger the patient, the more malignant the tumor.

The duration of the symptoms prior to treatment naturally bears a definite relationship to the prognosis.

An analysis of all our 3-year cases shows the following:

THE RELATIONSHIP OF THE DURATION OF SYMPTOMS TO PROGNOSIS

DURATION OF SYMPTOMS	NO. OF CASES	PERCENTAGE OF 3 YEAR PATIENTS ALIVE
6 months or less	21	57.
7 to 12 months	32	31.2
1 year or more	28	17.8

In 59 or 71 per cent of these cases, the duration of symptoms was between 5 and 18 months. In over 15 per cent, the symptoms had been present for two years or more.

The treatment of choice for adenocarcinoma of the fundus of the uterus consists in panhysterectomy and bilateral salpingo-oophorectomy. Whether or not preliminary or postoperative irradiation, or both, will be found advisable is still a mooted point. In the Gynecologic Clinic of the Hospital of the University of Pennsylvania, preliminary irradiation has not been resorted to routinely, and postoperative irradiation has been employed only in selected cases, usually when the tumor was found to have been in an advanced stage. The Wertheim operation has not been performed as a routine procedure, although as extensive a hysterectomy as is possible for the individual case has been performed. For those cases in which the carcinoma is too advanced for hysterectomy, radium irradiations are an excellent palliative procedure and in some cases appear to be curative. The dosage employed has generally been 2400 mgh. and in a few cases postoperative irradiation by means of deep x-ray. From the study of our end-results, we are led to favor the routine postoperative irradiation in all cases that offer any hope of cure. The following table presents the results in all cases including those too advanced for any form of treatment:

Total number of cases	115	
Percentages of cases traced	91.31	per cent
Percentage of mortality from all causes	56.	per cent
Percentage alive	44.	per cent

We realize the fallibility of an arbitrary statement regarding 3- or 5-year cures, but for purposes of comparison and study, have adopted the 3-year standard. We are aware that recurrences may occur in some of our 3-year cases which now appear well, but have employed this period in order to secure groups of sufficient size to warrant the deduction of at least tentative conclusions. Weibel²² viewing Wertheim's cases, found that all recurrences occurred within three years. The chief value of statistics relating to carcinoma are those showing the end-results. In compiling statistics relating to cancer, two points are of paramount importance: the first is the number of 3- or 5-year cases which have been observed and the number which are alive; and the second vital point is what methods have been resorted to, to secure the results. Comparison of operative statistics may be misleading unless accompanied by figures relating to the percentage of operability. One surgeon may operate upon 90 per cent of his carcinoma patients and another upon only 10 per cent; the latter will probably be able to show a much higher percentage of 5-year cures among his

operative cases and a lower operative mortality, whereas the former may actually have more 5-year patients alive.

The following table presents the results of all our three-year cases traced without regard to the form of treatment or the advancement of the disease, and includes cases too advanced for either irradiation or operation:

Total number of 3-year cases	87
Percentage alive	34.8
Percentage alive, no recurrences	27.9
Percentage alive with probable recurrence.	6.9
Percentage of cases dead, all causes	65.1

The following table shows the 3-year results in those cases upon whom hysterectomy was performed. These, in general, are the earlier cases:

Total number 3-year hysterectomies	57
Percentage alive	37.5
Percentage alive, no recurrence	30.5
Percentage alive, probable recurrence	7.
Percentage dead, all causes	62.5

Cullen records 60 per cent of his cases alive but some of these were operated only one year previously. Wilson²¹ records only 24 per cent of absolute cures. Sixty-five per cent of our 3-year cases were subjected to hysterectomy and this list contains a relatively large proportion of moderately advanced cases.

The following table shows the results secured in a series of hysterectomies performed for early moderately fundal carcinoma:

Total number of early 3-year cases	26
Percentage alive	54.
Percentage alive, no evidence of recurrence	42.
Percentage dead, all causes	46.

Whereas this group is too small from which to draw definite conclusions, we believe that 50 to 60 per cent of ultimate cures may be expected from this class of cases. This group includes only cases in which no metastasis was discovered at operation, and in which the growth was macroscopically limited to the fundus and in no instance was there less than 1 cm. of macroscopically normal myometrium between the tumor and the serosa.

Preliminary irradiation has not been routinely adopted in the present series. The following table shows the results secured in a small series of cases in which this treatment was adopted, the dosage varying from 1200 to 2400 mgh.

Three-year cases treated by radium irradiation followed by hysterectomy:

Total number of cases	10
Percentage alive	50.
Percentage mortality, all causes	50.

Total number of 3-year cases treated by curettage and radium irradiation alone:

Total number of cases	20
Percentage 3-year cases alive	45.
Percentage 3-year cases alive, no recurrences	35.
Percentage 3-year cases alive, probable recurrences	10.
Percentage 3-year cases dead, all causes	55.

The number of cases comprising this group is too small from which to draw definite conclusions. Small group statistics are unreliable as a few cases alter results so markedly. The majority of cases constituting this group were too advanced to permit of radical operative intervention. In addition, however, it includes a few extremely early cases and because of this mixture, it is somewhat unsatisfactory as a means of comparison to the preceding groups. Whereas the figures in this table emphasize the value of radium irradiation, and are actually superior to those secured by hysterectomy in the proportion of 45 per cent alive after three years, as against 37.5 among those submitted to radical intervention. At the risk of repetition, we would warn from drawing too definite conclusions from such a small number of cases as this table comprises. Nearly all of the patients in this group were temporarily improved by the irradiation, and in the majority of those who ultimately succumbed, life was prolonged and made more comfortable. For these patients, irradiation by radium is the greatest palliative ever placed before the medical profession, and offers a chance for cure even in those cases too advanced for operation. Bailey and Healy²² record unsatisfactory end-results from irradiation in this class of cases. They state that in nearly every instance, cases subjected only to irradiations, evidence of the disease reappeared within a year.

Three-year cases too advanced for any form of treatment or who refused operation	10
Three-year cases too advanced for treatment	6
Three-year cases who refused treatment	4
Dead	10

A comparison of the hysterectomy mortality based upon all deaths occurring during the patients' stay in the hospital compared with that following radium irradiation shows the following results of the entire series of 115 cases:

Hysterectomies	68	Radium irradiations	32
Deaths	5	Deaths	2
Peritonitis	3	Myocarditis	1
Pulmonary embolism	1	Pulmonary embolism	1
Myocarditis	1	Operative mortality, all causes ..	6.2%
Operative mortality, all causes ..	7.3%		

In considering the relative mortalities from these two forms of treatment, the advanced stage of the cancer in many of the patients submitted to irradiation must be considered. Radium was employed in the majority of cases merely as a palliative. We would venture to state that had irradiation only been employed upon all cases, the operative mortality would have been materially lessened. Of the entire series of 115 cases, but seven were too advanced for any form of treatment, and an additional 8 cases refused to submit to treatment.

From the Crocker Institute, Wood and his coworkers have amply demonstrated the factor which is played by trauma in the dissemination of cancer. Many cases of fundal carcinoma present only vague symptoms during the early stages of the disease. The necessity of diagnostic curettage in these cases is obvious. The question, however, arises as to the part which curettage may play in the dissemination of carcinoma in this type of case and with a view to at least throwing some light on this phase of the problem, we have studied the cases in which hysterectomy has been performed alone or immediately followed by curettage, and compared these results with those secured from a group of patients in which a curettage was previously performed. In the latter group are included only cases in which the curettage was performed at least 24 hours or more prior to the hysterectomy.

Three-year hysterectomies only, or D. and C. immediately followed by hysterectomy.

Number of cases 35

Percentage alive 37.5

Three-year hysterectomy preceded by curettage 24 hours or more previously.

Number of cases 22

Percentage alive 40.9

The results in this series are actually in favor of those cases which have been submitted to a preliminary diagnostic curettage in the rate of 40.9 to 37.5 per cent. In considering these figures, it must be borne in mind that those cases which were submitted to an immediate hysterectomy, were as a group, more advanced, as naturally a diagnostic curettage would not be performed except in the case of a doubtful clinical diagnosis. At all events, this study seems to prove that a preliminary curettage is not markedly detrimental to the ultimate outcome. It is at least possible that a routine irradiation following the diagnostic curettage would even improve the results in the latter

group. Certainly had a diagnostic curettage not been performed, the diagnosis would have been delayed in many of the cases of carcinoma and the benign lesions could not have been excluded.

Whereas a panhysterectomy is indicated in all cases of carcinoma in which the uterus is to be removed, this has occasionally not been possible or in a few instances the malignant character of the lesion was not recognized until the specimen reached the laboratory. The latter has been the case in a few specimens in which the uterus was removed for myomata and a fundal carcinoma subsequently discovered. A comparison of these groups shows the following results:

Total number of 3-year hysterectomies	57	37.5 per cent alive
Total number of 3-year panhysterectomies	40	43.3 per cent alive
Total number of 3-year supravaginal hysterectomies ..	17	24.2 per cent alive

These figures indicate the importance of removing the entire uterus in this class of cases.

With only 34.8 per cent of three-year cures in our series, the necessity of early recognition of carcinoma is apparent. To attain this end in any group of cases, it will be found necessary to resort to diagnostic curettage in a relatively large proportion of cases. Even excluding the possibility of dissemination of the carcinoma by the curettage, any preliminary operation which occurs a day or two prior to the second operation has many drawbacks; the added discomfort, the mental effort upon the patient and the fact that anesthesia has to be administered a second time, all mitigate against this procedure. In a proportion of cases, however, this cannot be escaped. In a few cases when the amount of material secured at the curettage is large, a few of the larger portions of the specimen may be utilized for the freezing method. In general, frozen sections have not proved as reliable in our hands as paraffin preparation, and this is particularly true in the case of curettings. When only a small amount of curettings is secured, it is safer to rely upon a rapid paraffin method by which a practically certain diagnosis may be made in twenty-four hours. On the other hand, if the amount of tissue is considerable, one or two large pieces may be utilized for the freezing method. If these are found positive for carcinoma, it is safe to recommend that the hysterectomy be performed at once; if, however, the results secured by the freezing method are doubtful or negative, the final histologic diagnosis should be delayed until the paraffin sections have been examined. In passing, it may be stated that a careful macroscopic examination of curettings which have been thoroughly washed, placed in a small flat glass dish containing clean water and examined with a magnifying glass in a good light, is of distinct value.

Frank²² states that gland recurrences in the lumbar, inguinal, iliac,

liver and lung metastasis are most common and that wound implantations in the perineal scar after Schuchard's incision, have been repeatedly reported (Hirsch²⁴ and Milner²⁵). True vaginal metastases have been observed by Hellendahl.²⁶ In only two of our cases have metastases been observed in the ovaries and in only one in the tube. Whereas we are unable to give accurate figures, the majority of the recurrences have been pelvic. A possible explanation of this may be found in the theory of the origin of perforating hemorrhagic ovarian cyst advanced by Sampson.²⁷ If we accept that epithelial cell from the normal endometrium may be swept out through the fallopian tube and produce implantation growths in the ovary and adjacent structures, it is at least possible that a similar condition may occur in the cases of carcinoma cells originating within the uterine cavity. In only one instance have we observed a metastasis to the uterus from an ovarian carcinoma. This case is not included in our series.

Carcinomatous degeneration may occur in endometrial polyps. Among 104 endometrial polypi, we have observed three such instances. These have not been included in the aforementioned study. All the three are alive and with no evidence of recurrence. In the case of carcinomatous degeneration of an endometrial polyp, the most important points to determine from a prognostic viewpoint, are the condition of the pedicle and whether or not an implantation growth has occurred. One of our cases is so unique as to require special mention. The specimen consisted of a double fundus, one of which was small and atrophic, the other was the seat of an intramural myoma, the size of an orange, and contained a large tongue-shaped polyp, the distal half of which was the seat of an adenocarcinoma. In the posterior wall of the vagina, was a squamous-cell carcinoma 6 cm. in diameter. This is the only case in which carcinoma has been observed in malformed uteri, and the only case in which multiple carcinomata have been present.

CONCLUSIONS

1. Carcinoma of the body of the uterus is less frequent than cancer of the cervix. A possible explanation of this fact is that chronic cervicitis is a common lesion whereas true chronic corporal endometritis is relatively infrequent.

2. Carcinoma of the fundus is a disease of advanced life. Over 71 per cent of patients, constituting the series under discussion, were 51 years of age or older.

3. Childbirth plays little part in the etiology of this neoplasm. In the present series 26 per cent were spinsters.

4. Hemorrhage and discharge are the most important symptoms. In 81 per cent hemorrhage was the first symptom. Pain, cachexia and loss of weight generally indicate an advanced and inoperable tumor.

5. With only 25 per cent of cases presenting themselves in the early stage and only 34.8 per cent of three-year patients alive, the importance of early diagnosis may be recognized.

6. Absence of pain and the nonrecognition of the significance of irregular bleeding account for the majority of advanced cases.

7. The histologic examination of curettings offers an almost certain means of diagnosis, even in the early cases.

8. The Clark test which consists in the passage of a sterile sound is of great practical value. Absence of bleeding following this test goes a great way towards excluding carcinoma. The test is an office procedure, and its more general adoption will result in the recognition of many early cases.

9. In the present series, the clinical diagnosis was correct and positive in 57 per cent of cases; the cancer was suspected in an additional 23 per cent, and in 19 per cent, the cancer was unsuspected.

10. In 75 per cent of the unsuspected cases, the symptoms resulting from cancer were masked by those produced by preexisting myomata. The combination of adenocarcinoma of the body of the uterus and myoma is a frequent one; 20.8 per cent of the present series of cancers were associated in these tumors.

11. The chief point of prognostic value is the integrity of the myometrium.

12. The duration of the symptoms has a direct ratio to the percentage of permanent cures. In cases in which symptoms were present for six months or less, 56.5 per cent were alive at the end of three years; when symptoms were present 7 to 12 months 31.2 per cent, and when symptoms had been present over one year, but 17.8 per cent were saved.

13. The treatment of choice is panhysterectomy and bilateral salpingoophorectomy.

14. Postoperative irradiations by radium or deep x-ray are of distinct value.

15. Radium irradiation is the greatest palliative and results in greater comfort to the patient and prolongation of life.

16. Radium irradiation offers a hope of cure even in cases too advanced for operation.

17. The percentage of three-year hysterectomy cures was 37.5 per cent, whereas in a like series, the irradiation resulted in 45 per cent of three-year cures. The result is probably due to the small number of cases comprising the irradiation group. A large group would probably show hysterectomy giving the better results.

18. The percentage of three-year hysterectomy cures in the early cases was 42 per cent.

19. The operative mortality from hysterectomy was 7 per cent and from radium 6 per cent.

20. The total mortality from all causes in the entire series of 115 cases was 56 per cent.

21. The total number of three-year cases was 86; of these 34.8 per cent are now alive.

22. Carcinoma of the fundus must be considered a relatively malignant form of cancer. The teaching that 60 to 75 per cent of these cures be permanent cures is, in our experience, fallacious.

23. Preliminary curettage plays little part in the dissemination, and its value as an early diagnostic procedure far outweighs any disadvantage accruing from its employment. Without diagnostic curettings, the majority of early cases would be overlooked or many normal uteri sacrificed.

24. Carcinomatous dégeneration occurred in less than 3 per cent of endometrial polypi. All are alive. In these cases the important points are the condition of the pedicle of the tumor and whether an implantation growth has occurred.

REFERENCES

- (1) *Frank, R. T.*: Gynecological and Obstetrical Pathology, D. Appleton Co., 1922.
- (2) *Peterson, R.*: Surg., Gynec. and Obst., 1919, xxix, 544.
- (3) *Wilson, Edcn and Lockyer*: New System of Gynecology, London, 1917, ii, 478.
- (4) *Norris, Chas. C.*: Gynecological and Obstetrical Tuberculosis, D. Appleton Co., 1922.
- (5) *D'Halluin and Dalral*: Bull. et mem., soc. anat. de Paris, July, 1910.
- (6) *Hoblanck*: Veit's Handbuch der Gynäkologie, Wiesbaden 1908, 3, ii, 672.
- (7) *Cullen, T. S.*: Cancer of the Uterus, N. Y., 1900.
- (8) *Noble*: Jour. Am. Med. Assn., 1906, xlvii, 1881.
- (9) *Williams*: Boston Med. and Surg. Jour., 1908, clix, 463.
- (10) *Deaver, J. B. and Reiman, S. P.*: Am. Jour. Med. Sci., 1921, lxi, 661-663.
- (11) *Ladinsky*: Surg. Gynec. and Obst., 1915, xx, 325.
- (12) *Frank, R. T.*: Am. Jour. Obst., 1916, lxxiv, No. 3.
- (13) *Weiner*: N. Y. Med. Jour., 1917, cv, 1079.
- (14) *Norris, C. C.*: AM. JOUR. OBST. AND GYNEC., Jan., 1923.
- (15) *Schottländer and Kermauner*: Uterus Karzinom, Berlin, 1912.
- (16) *Ewing, J.*: Neoplastic Diseases, Phila. and London, 1919.
- (17) *Norris, C. C.*: Primary Squamous Celled Carcinoma of the Body of the Uterus, Am. Jour. Obst., 1907, lvi, No. 6.
- (18) *Mahle, A. E.*: Surg., Gyn. and Obst., March, 1923.
- (19) *Terry, B. T.*: Jour. Am. Med. Assn., July, 1923.
- (20) *Weibel*: Arch. f. Gynäk., 1913, c, 135.
- (21) *Wilson, Edcn and Lockyer*: New System of Gynecology, London, 1917.
- (22) *Bailey, H. and Healy, W. P.*: AM. JOUR. OBST. AND GYNEC., 1923, vi, 402.
- (23) *Frank, R. T.*: Gynecological and Obstetrical Path., N. Y. and London, 1922.
- (24) *Hirsch*: Ztschr. f. Geburtsh. u. Gynäk., 1911, xlix, 742.
- (25) *Milner*: Arch. f. klin. Chir., 1904, 74.
- (26) *Hellendahl*: Hegar's Beitr. z. Geburtsh. u. Gynäk., 1902, v, 6.
- (27) *Sampson, J. A.*: Arch. Surg., 1921, iii, 245.

(For discussion, see page 625.)

SOLID OVARIAN TUMORS; THEIR PATHOLOGY*

BY SAMUEL H. GEIST, M.D., F.A.C.S., NEW YORK CITY.

Associate Gynecologist and Associate in Pathology, Mt. Sinai Hospital

IT is practically impossible to classify ovarian tumors into definite groups for neither clinically, anatomically nor pathologically can one always, with exactness, relegate a particular tumor to a special category. As Goodall said in a recent paper dealing with the histogenesis of ovarian tumors, the various classifications of ovarian tumors have not been as a rule histogenic, but rather topical, clinical or histological.

In this paper a clinical differentiation will be made, but overlapping must occur. Cystic tumors, that by the development and overgrowth of solid malignant portions become practically solid neoplasms, and solid new growths, that because of degenerative processes of various types become partially cystic, will be classified as solid tumors.

Pfannenstiel has classified tumors of the ovary most satisfactorily into parenchymatous and stromatogenous tumors. This same scheme can also be used for the solid tumors of the ovary.

Under *parenchymatous* solid growths would be included, the carcinomata and the cysts that develop carcinomata, either in their wall or papillae. The cystic portion may predominate in some instances, but for the sake of simplicity they will be considered in the solid class. Here also dermoid cysts that develop carcinoma, and the so-called solid teratoma may be included, though their histogenesis is somewhat different.

In the *stromatogenous* class are listed fibroma, fibromyoma, sarcoma of various types, endothelioma, angioma chondroma and myxoma. Many of these are rarities and the occurrence of others is open to much question.

Combinations such as chondro- and osteosarcoma are probably one-sided developments of teratomatous growths.

The solid tumors as a group are less frequent than the cystic ones, but like the cystic growths may have papillary excrescences on the surface, and may have a complete capsule or one that is often perforated, if the tumor is malignant. The solid tumors are less often pedunculated than the cystic, and the malignant ones most infrequently so. There is a tendency to involve the entire ovary, but to maintain its outline for quite a long time.

*Read at a meeting of the New York Obstetrical Society, December 11, 1922, as part of a Symposium on Solid Ovarian Tumors.

Of the epithelial or parenchymatous new growths of solid nature practically all are malignant or potentially so. Carcinomata of varying types occur as the most common tumor of this variety. They comprise from 15 to 20 per cent of all ovarian tumors.

They are often bilateral, Kelly finding this to be so in 36 per cent of the cases. Pfannenstiel quotes 90 per cent as the figure, but this, of course, includes the cases that develop involvement of the second ovary at a later period. In other words this high figure means involvement of both ovaries but not of necessity simultaneous involvement. Others state that in 50 per cent of the cases coming to operation both ovaries are involved.

The average age of occurrence is from 45 to 55 years though they may occur even in children. This is especially so of the solid teratomata. The extreme age limits for carcinoma are from 4 to 69. There have been 15 cases of true carcinoma recorded that developed before puberty.

Grossly the solid carcinoma may present as a small or medium sized ovoid or rounded, slightly nodular or lobulated mass. It is often encapsulated, though the capsule may show defects through which the tumor may grow to implant itself on contiguous surfaces and adjacent organs. Commonly these tumors are surrounded by adhesions, either fibrous alone or containing malignant cell masses. These adhesions probably form early in the development of the tumor because of the mechanical and possible chemical irritation of the neoplasm to the peritoneum.

The three common types of carcinomata are the medullary, the adenomatous and the scirrhus. A papillary development is not unusual, 50 per cent of the papillary types being adenocarcinoma. The simple or papillary cyst, that develops a carcinoma in its wall or papillae, is a much less malignant tumor than the solid carcinoma with degenerative cyst formation.

On section the medullary tumors are soft, brain-like in consistency, pinkish or yellowish white in color with areas of hemorrhage and necrosis giving a variegated appearance to the cut surface. There are often areas of liquefaction with the formation of fairly large sized fluid collections. They may be typical degenerative cysts with a shaggy or smooth wall, occasionally epithelial lined. Now and then one finds areas of calcification which gives a gritty feel to the cut surface, the psammoma type of tumor.

In the adenomatous group the cut section, too, is soft and cellular with small and large sized cavities containing a thick viscid fluid rarely pseudomucin. Where pseudomucin is present the probability is that we are dealing with a carcinoma arising in a preexisting pseudomucinous cyst.

The scirrhus type often resembles a fibroma. The white fibrous cut

section and the hardness of both these tumors make it difficult to distinguish the two at times. In fact these scirrhus tumors have so low a grade of malignancy that they are often an accidental finding in elderly women.

The same general features of gross appearance and cut section as described above, apply to solid carcinoma arising in a cyst or dermoid tumor. In the cysts one commonly finds either in the wall or papillae the solid malignant tumor development.

Histologically the medullary type presents a rather scanty stroma with masses and solid nests of irregular large atypical rapidly dividing epithelial cells. Here, as in the papillary carcinoma, epithelial metaplasia to a squamous cell type is found.

In the adenomatous group masses of irregular atypical infiltrating glandular structures are seen. The cells typically malignant, many layered and dividing, penetrate the basement membrane and invade the surrounding ovarian stroma.

In the less malignant scirrhus forms one finds a fibrous tissue stroma with scattered islands, strands and rows of small atypical cells.

A rather atypical solid tumor classed by some as malignant is the so-called folliculoma. This really arises from the original germinal epithelium as a small white tumor rarely growing to a large size. In most cases only a portion of the ovary is involved. It has a tendency to form alveoli of large polygonal cells with the suggestion of mimicing a true follicle. There are areas of liquefaction with degenerated cells resembling true ova and occasional extensive epithelial lined cyst formation. The ova-like cells are also found in medullary carcinomata but true ova have never been definitely proved to exist in carcinoma.

Metastases of solid epithelial tumors are often found in the omentum, pelvic or abdominal organs, and on the peritoneum. While this also may take place in the more benign papillary adenomatous cysts, these latter metastases are all surface contact implantations, and not infiltrating transportation deposits. The lumbar, iliac and supraclavicular glands may be involved also.

The frequency of bilateral tumors is due not so much to primarily bilateral ones, that is a multicentric origin, as to the later involvement of the second ovary either by contact or by peritoneal and lymphatic transportation.

In unilateral cases of malignancy 50 per cent recur while in bilateral cases 89 per cent have recurrences. Pfannenstiel states that 66 per cent of all malignant solid ovarian tumors recur. It is interesting to note that in many instances the remaining ovary has subsequently become involved, even when at the time of operation it seemed, at least grossly, uninvolved. Recurrences may take place in the stump,

the wound, the peritoneum or the remaining pelvic viscera. Such recurrent tumors have been described as occurring as late as twelve years postoperative. In about 15 per cent of the cases with complete operation an absolute cure is achieved. In those cases where glands are involved an attempt to extirpate them is useless, as the inaccessible ones are also involved. Often when the case comes to operation the lymph nodes are already involved.

Secondary ovarian carcinoma is common. Many of the bilateral carcinomata of the ovary are really metastatic tumors with a primary focus either in the gastrointestinal tract, the breast or other organ. When the primary tumor is in an intraperitoneal organ one may get metastases in the ovary by direct extension, peritoneal implantation, lymph or blood stream transportation. The dependent position of the ovary in the abdomen, its circulatory variations due to functional activity, and the surface trauma due to ovulation may predispose to implantation.

These secondary tumors appear first as small surface nodules which may reach the size of an orange. The shape of the ovary is often maintained. A capsule may be present which may either be intact or perforated by tumor.

On section these growths are edematous, translucent and waxy, and some, especially those from the gut, may have a papillary appearance. A typical Krukenberg tumor microscopically shows a sarcoma-like edematous connective tissue, containing spindle cells of varying sizes with variations in tinctorial properties and other signs of malignancy. A very characteristic form of cell is the seal ring type. It presents a large cell body containing a mucoid protoplasm with a small eccentrically placed nucleus. This type of tumor is rather distinctive, but in practically every instance is metastatic, the change in the structure of the tumor being due possibly to the variations and peculiarities of the ovarian circulation due to its functional activity. While a few may be primary, a most careful autopsy is necessary to rule out the possibility of a parent growth in some other organ. Other metastatic ovarian carcinomata resemble in the main the primary growth. While a metastasis may occur in a cyst, a carcinoma developing in a preexisting cyst must be classed as a primary tumor.

The symptoms of solid ovarian carcinoma are rarely characteristic. Rapid growth is associated with all of them especially the medullary type and a preexisting cyst that suddenly enlarges in size suggests a malignant transformation.

Ascites is also commonly associated with solid ovarian tumors, benign as well as malignant, and may reach a rather marked degree. In carcinoma it is often bloody. The cause of this ascites is speculative. Chemical and gross mechanical irritation of the peritoneum

and possible circulatory embarrassment have been given as explanations. Menstrual disturbances are not common.

Teratoma may be classed as a solid epithelial tumor though it is neither, strictly speaking, solid nor purely epithelial. Its origin is from a totipotential blastomere, one that has the latent developmental ability to reproduce all forms of tissue corresponding to the three embryonal layers. It is a rare tumor and has been described in children and adults, but no case has been described in a woman who had reached the menopause.

Macroscopically they are unilateral, pedunculated and nodular tumors that may weigh as much as 50 pounds. They grow extremely rapidly. On section they show solid and microcystic areas, papillary growth and a variegated color scheme.

Histologically one finds all types of developed tissue with a myxomatous and sarcomatous stroma. The cells and their conglomerations that form tissue, for the most part, are unripe. Often one finds typical adenocarcinomatous areas as atypical variations of the glandular elements in the growth.

Cystic spaces occur, lined by skin and mucosa, and true adenomatous areas can be identified suggesting gastrointestinal mucosa. Embryonal tissue-like sarcoma, epithelial structures and malignant adenomatous areas are indiscriminately jumbled together to make an unorganized accumulation of developed tissue, embryonal structures, cysts and malignant areas with true bone and cartilage.

Often there is found an overgrowth of chorionic epithelium of both Langerhans and syncytial cells resembling true chorioepithelioma.

In solid teratoma the mortality is 85 per cent. Superficial dissemination over the peritoneum and retroperitoneal involvement takes place. The metastases are by implantation or lymphatic extension and may be simple structures or teratomatous like the parent growth.

In several cases in young children the tumor has been associated with precocious puberty. In one case after the removal of the tumor the signs and symptoms of maturity disappeared. The other symptoms are those of any ovarian malignant tumor.

Another rather rare and peculiar solid tumor has been described as struma ovarii. It is believed to be a one-sided development of a teratoma. Its structure is like the typical thyroid and it contains both colloid and iodine. It is malignant, produces ascites and forms metastases.

The *stromatogenous tumors* include the great group of connective tissue neoplasms both benign and malignant. Under the benign stromatogenous growths the fibromata and fibromyomata are the most common type. Rarities such as angiomatica chondromata and osteomata have been described.

Fibroma and fibromyoma are not common, comprising about

1.3 to 2 per cent of ovarian tumors. Grossly they resemble each other. They are hard, diffuse tumors, rounded or lobulated, that replace the ovary but maintain its shape. They may be peduncular. The very small ones may appear as flat or papillary surface tumors. These fibromata, unlike the uterine type, cannot be enucleated. They are hard, rounded occasionally encapsulated tumors. On section they have a pearly white or pinkish cut surface with a coarse fibrous whorl-like appearance. The myomatous ones show areas of glistening, translucent grayish muscle. If there has been torsion of a pedicle there is hemorrhage, which gives to the cut surface a varying color scheme.

One finds areas of necrosis and calcification that grossly appear yellowish and feel gritty. True bone formation is found in them but here one must differentiate between this bone formation and the bone of a teratoma with true periosteum and marrow. Degenerative processes with liquefaction and cyst formation are not uncommon. Occasionally one finds these fibromata in the walls of simple cysts.

The age of occurrence varies from 8 to 83 years. They are commonest between 40 to 50 and are usually unilateral, though 20 per cent are bilateral. They may grow very large, in fact one has been reported that weighed 90 pounds. The rate of growth, however, is very slow. The symptoms are not characteristic. Rarely are there menstrual symptoms except when the tumors are bilateral and replace entirely both ovaries. In these instances amenorrhea is present. The other symptoms are those associated with pressure and the presence of a large pelvic tumor. Ascites is also common in large tumors. Forty per cent of the cases have this symptom: bloody ascites is found only if the tumor is twisted. The prognosis is good.

The stromatogenous malignant tumors include all the sarcomata of which there are many varieties and combinations. They are not common tumors, forming 2 to 5 per cent of all ovarian tumors. They are grouped as fibro, spindle and round cell sarcoma as the primary types. In addition the rarer varieties, such as angiosarcoma, endothelioma, chondrosarcoma, osteosarcoma have been described.

They may be, and usually are, primary tumors though they may also arise as a degenerative change in a fibroma or as a metastasis from some distant or contiguous primary focus. Such metastatic growths are rarer than the primary tumors. The average age of occurrence is 32 years though 40 per cent occur in patients under 25 years and cases have been reported in children and even in the fetus. In 30 per cent of the cases the tumors are bilateral, not as frequent, however, as in carcinoma. The round celled type is most frequently bilateral.

Grossly these tumors resemble the benign type of stromatogenous tumor. They are solid, smooth or slightly nodular tumors which, while they grow more rapidly than the benign tumors, like them,

tend to maintain the shape of the ovary or mimic a kidney in gross outline. They may be pedunculated. If fibro- or spindle cell sarcoma they are hard. The consistency depends on the fibrous tissue content of the tumor. If round cell in type they are soft, friable, brain-like in consistency. The cellular round cell type often resembles medullary carcinoma grossly.

The cut section is pinkish or yellowish white in color. Often they show areas of punctiform hemorrhage or larger hemorrhagic zones with yellow, lutein-like patches of necrosis. Here and there are areas of liquefaction with large dilated vessels and lymphatics, the latter looking like tiny elongated cysts with straw- or clear-colored serum in them. Again there may be a marked edema, giving the cut surface a gelatinous appearance. Cystic degeneration, with the formation of large sized cavities, is not unusual. Occasionally one finds an epithelial-like lining to these cysts.

Microscopically one gets round, spindle and polymorphous celled tumors with giant cells, either mono- or polynuclear. There are also the mixed forms such as myosarcoma, containing atypical muscle cells, and chondro- and osteosarcoma. Where true bone and cartilage is found it is often difficult to rule out the possibility of a one-sided teratoma.

Spindle cell tumors are slow growing with irregular sized cells of varying and atypical forms. The nuclei are likewise bizarre in shape and show marked variability in their avidity for stain. The cells are often multinuclear. Of course there are variations between the benign, but cellular fibroma, and the more benign type of fibro- or spindle cell sarcoma.

The fibromyomata also resemble the spindle cell sarcoma, but the muscle cells in the myomata are usually larger, the nuclei small and more rod-like than the spindle cells of a sarcoma. In the myosarcoma, however, one gets true malignant cells which differ from the normal muscle cells above described and approximate those of the typical sarcoma. The spindle cell type presumably arises from the stroma.

The round cell tumor is softer than the spindle cell variety and more cellular. The cells vary in size and shape but the majority favor the more unripe round type than the spindle cell group. Here, too, cystic spaces are seen and all the changes of hemorrhage, fatty degeneration necrosis and myxomatous transformation are encountered. These tumors grow more rapidly than the other forms of sarcoma. This type has its origin possibly from the perivascular areas and is most malignant. It seems to be almost a rule that the softer the tumor the more unripe the cells, and the more unripe the cells the worse the prognosis.

Other types of sarcoma such as angiosarcoma are rare. The endotheliomata are classed by some as angiosarcoma both hemangio-

sarcoma and lymphangiosarcoma. These angiosarcomata are malignant, solid nodular tumors and extremely cellular. The cells are small, round, arranged in alveoli with a tendency to group themselves about the vessels. They occasionally have a myxomatous stroma. Some of the tumors have chains of small cylindrical cells with a more fibrous stroma.

Metastatic or secondary sarcomas of the ovary are rare. Melanosarcoma occurs as a part of a general dissemination of this particularly virulent neoplasm. The secondary ovarian tumors are deposited either through the peritoneum, by direct contact from neighboring organs or by blood and lymph transportation. The more cellular the tumor the more malignant it is, just as in the primary growths. Occasionally the metastatic tumors are bilateral but not as commonly as in metastatic carcinoma.

In fibrosarcoma the prognosis is good. In the round cell type it is bad, as this form grows rapidly, metastasizes most frequently and recurs most often. In young children there may be some signs of precocious puberty such as the enlargement of the breasts, increased hair growth in the pubes and axilla, rarely menstruation.

The symptoms of both primary and secondary tumors show nothing specific. The symptoms are due to disturbed ovarian function, to the size of the tumor, and to the complications attending it, such as necrosis, hemorrhage, incarceration, infection and rupture. Seventy per cent have ascites which may be bloody, particularly if there is a twist of the pedicle. In the instances where the entire ovarian parenchyma is destroyed amenorrhea is present.

It is interesting to note that the functional disturbances of the ovary, while uncommon, may be of any type. In 75 per cent of the cases the menstrual cycle is normal.

Sterility is not the rule and often the presence of a pregnancy adds an extra menace, as the tumor may offer an insuperable obstacle to a normal delivery, necessitating operative interference. On the other hand pregnancy may predispose to some of the more annoying complications.

Torsion is the most common accident. It occurs in about 15 per cent of all cases. It may occur in children. It commonly affects the medium sized tumors. As a result of torsion there are numerous secondary changes such as hemorrhage, gangrene and rupture, all of which give special indications for operative interference.

Appended is a brief resumé of the 50 cases of solid ovarian tumors studied.

There were 31 cases of carcinoma; the ages varied from 12 to 65. Twenty-four cases had primary tumors and seven secondary. Of the primary tumors six occurred in preexisting cysts; in one of these latter cases there was a rupture of the cyst pre-operatively. These

were all papillary adenocarcinoma. Of the remaining eighteen, 12 were papillary adenocarcinoma and 6 were medullary. Three cases died shortly after operation, one of peritonitis. In 10 cases, at the time of operation, there were already abdominal and omental metastases present. Most extensive metastases were found in the two youngest cases, 12 and 13 years respectively.

The symptoms were not characteristic, and in only three instances was there a disturbance in menstrual function. In one case there was a history of profuse periods every three weeks, in a second instance spotting for one month, and in a third, irregular intermenstrual spotting for three months.

The older women had had a normal menstrual history, and then the menopause. There were 14 cases with ascites, in 10 instances bloody. In 11 instances the tumors associated with ascites were papillary adenocarcinoma, in two medullary, and in one a typical Krukenberg. In five instances there were pelvic recurrences in 6 months. Unfortunately the follow-up was not complete.

There were 4 instances of carcinoma occurring in dermoids; three were squamous, one was medullary. The ages varied from 35 to 50 years. One died of peritonitis postoperatively and three made operative recoveries. One subsequently developed lung metastases in a few months. In two cases the cyst had been overgrown and perforated, with involvement of the intestine. In only one case was the menstrual period changed, and that but a slight increase in the amount. The chief complaints were, as in the carcinomata, pain, an abdominal mass with rather sudden increase in size.

There was one case of a solid teratoma in a woman thirty-one years of age. She had noticed a mass for two years which, at time of operation, was the size of a fetal head. She made a good recovery.

There were nine cases of sarcoma. Six were fibrosarcoma, two round cell, and one perithelial sarcoma. One of the round cell tumors was inoperable, and the other had local recurrences in six months. The age variations in the nine cases were from 25 to 56 years. There were no characteristic symptoms; the chief complaints were pain and the presence of a mass. In only one case was there a menstrual disturbance, and that only a slight increase in the amount of flow at the time of operation. Six of the cases had ascites and in three of these the tumor was twisted.

Of the benign tumors there were seven cases; five fibromata and two fibromyomata, the ages varying from 20 to 62 years. They all made operative recoveries.

In two cases there was a history of profuse menstruation and in one woman of 40 there was a history of one year's amenorrhea. The chief complaint here was also an abdominal mass and pain. In four

instances the tumors were twisted, and in two of these ascites were present.

The clinical data were obtained from the Gynecological Service (Dr. Brettauer) Mount Sinai Hospital.

The pathological material was made accessible by Dr. F. S. Mandlebaum, Director of Pathological Department, Mount Sinai Hospital.

The literature has been ably compiled by: Pfannenstiel in Veits' *Handbuch der Gynäkologie*, Frank in his *Monograph on Gynecological Pathology*, Lynch in the *Monograph on Pelvic Neoplasms*.

300 CENTRAL PARK WEST.

(For discussion, see page 621.)

SOLID TUMORS OF THE OVARY; THEIR CLINICAL CONSIDERATION AND TREATMENT*

BY ELIOT BISHOP, M.D., BROOKLYN, N. Y.

(From the Department of Gynecology and Obstetrics of the Brooklyn Hospital)

LITTLE more than a year ago, I had a minor part in a tragedy of the operating room, indeed, a place where tragedies are none too rare. A girl, nineteen years old, of great promise from her intellectual and social position in the community, was being operated upon for a pelvic tumor. Her surgeon, a most distinguished gynecologist for more than a generation, had, as observing consultants, her family physician, an internist of international fame, and another gynecologist of note. A large solid tumor replacing the entire ovary of one side was found, and in the other ovary, was a solid tumor sufficiently large to be perfectly definite.

These three distinguished men gave pause before they would pass final judgment. Complete pelvic extirpation was elected, and each tumor was reported a carcinoma of the ovary by competent pathologists. Today this girl is alive and well. Why did these men of such great clinical experience hesitate? Malignancy of the cervix, or corpus of the uterus or of the external genitals, is quite readily recognized and, with minor differences, the treatment is fairly well standardized. In the ovary, however, the responsible operator faces three choices, the possibility of a solid tumor being a benign growth, such as a fibroma, or a cystadenoma to be met with removal and resultant return to health, the possibility of malignancy with operation and complete loss of sexual function in the largest sense, or the possibility of malignancy with attempt at conservatism with probable recurrence.

Few men are more familiar with abdominal neoplasms than Bland-Sutton, and yet he writes in Keen's *Surgery*: "Solid ovarian

*Read at a meeting of the New York Obstetrical Society, December 11, 1923, as part of a Symposium on Solid Ovarian Tumors.

tumors have puzzled pathologists and surgeons on account of the great difficulty of detecting specific differences in their minute structure *even with all the resources of histological chemistry* which would enable distinction to be made between (for example) the harmless fibroid and a spindle-cell sarcoma."

Williamson and Barris, in Eden and Lockyer's *System of Gynecology*, refer to the difficulty of distinguishing between papillomatous and carcinomatous ovarian cysts.

Our American textbooks are far from satisfactory. A survey of the older works extending back to the original classic of Edmund R. Peaslee on *Ovarian Tumors*, through the writings of H. C. Coe in the '80's and '90's, and then to the somewhat more modern work of Garrigues on *Diseases of Women*, showed, as we should expect, a good deal of confusion as to classification and the clinical consideration of this subject.

A. J. C. Skene writing in the Kelly-Noble *Gynecology and Abdominal Surgery* (1907) gives little space, even in this comprehensive work, to the subject, for from it we obtain the idea that, even in the mind of this master, there was confusion regarding diagnosis, as he tells us that cystic adenomata and cystic sarcomata present no diagnostic characteristics on physical examination.

Based on modern pathology, Crossen, *Diseases of Women*, gives a surprisingly small amount of space to the subject. We can practically dismiss it as a reference work after we get from it the following facts: he feels that the gross classification is the simplest; and that solid tumors represent about 5 per cent, and among these, fibromata are frequent and small in size. Of malignant growths, sarcomata are the most frequent, and both ovaries are usually affected, while carcinoma is usually secondary to a papillary cyst, and both ovaries, again, are affected in the majority of cases. As to diagnosis, I will quote him literally: "Owing to the rarity of solid tumors of the ovary, and the absence of distinctive symptoms, the diagnosis is usually made only after the abdomen is opened." Concerning treatment, he inadequately advises "removal."

Robert Frank, in his monograph on *Gynecological and Obstetrical Pathology* (Appleton), has collected more facts on ovarian tumors than any other work that I have covered, and I shall take the liberty of later quoting rather freely from him, as well as from Graves, who, in the latest edition of his book, gives us the most complete survey of ovarian tumors with more pathology than any other general clinical work.

Brooke Anspach, in his recent *Gynecology*, is very practical in discussing treatment, and to it I shall refer later.

The German literature with its wealth of material, has an attitude of more authority, and yet the most modern exposition of this sub-

ject by the great gynecologic pathologist, Oskar Frankl, shows us we have an undetermined field.

Current literature is replete with much specific material on this subject, even to the point of confusing the confused, and from it I shall try to bring in what matter I can, from which to draw, if possible, some worth-while conclusions.

Having referred to the indefiniteness in the literature, let us ask ourselves; "What is the subject in hand?" The crux of the matter is—do we know a malignant tumor when we see it, and feel it and section it; and again,—if we are confident or even suspicious that we are dealing with a malignant tumor, what will we do, not with it, but with the other pelvic organs?

This question has been asked this Society before. At the meeting on November 14, 1916, Dr. Frank Oastler reported three cases of ovarian cyst and queried "What constitutes malignancy in an ovarian cyst?" We all know that among the solid tumors, the proportion of malignancy is much greater. Dr. L. W. Strong gave the most scholarly answer, naturally speaking from the laboratory standpoint. He made one point that is useless clinically, even to the point of exasperation, yet we must admit it as true; "there is a stage where a thing obviously *not* a *carcinoma* is becoming a *carcinoma*!" Brooks Wells, H. J. Boldt, H. N. Vineberg, H. D. Furniss and LeRoy Broun took part in the discussion, and yet there was no unanimity of belief; the only rule they all followed, except Dr. Broun, was that every ovarian tumor should be removed *in toto*, with no tapping or morcellation.

As the reader of the previous paper has inferred,* classification of ovarian tumors on a scientific basis is unsatisfactory, and, in this view, he is supported by such men as Adami and Nichols, R. T. Frank and Graves, the two former admitting that the method of the older writers of dividing them into cystic and solid growths is a fairly good classification. Peaslee classified the solid growths not so antiquely as we might suspect, when one considers it was published in 1872. Anspaeh, omitting retention cysts, classifies all new growths of the ovary as epithelial, connective tissue or combined epithelial and connective tissue, but in each of the groups, he finds benign and malignant. Eden and Lockyer classify an ovarian tumor as innocent or malignant.

MacCallum feels that the differentiation of epithelial growths, as to their chemical contents, pseudomucinous or serous, is of no great importance; this in the face of the fact emphasized by Ewing and supported by practically all, including Graves, that pseudomucinous cystadenomata much less rarely develop papillomata than do serous cystadenomata and the latter much more frequently become carcinomata.

*See page 567, Gleet paper.

In this light, to quote from Graves, "We may then invoice them as solid tumors for they are in the same clinical relation to the patient as genuine carcinomata of the ovaries."

Thus, then, we must ask the indulgence of the Society when we consider that solid tumors consist of cystomata which have become papillomata, genuine carcinomata and dermoids and their histologic cousins, teratomata, which, by the way, while quite rare are very prone to a vicious malignant degeneration, while dermoids very rarely become so. Oskar Frankl, in 1920, collected only sixty cases from all the literature. In addition to these, we have the connective tissue growths, fibromata, fibromyomata, sarcomata, endotheliomata, etc.

If we are going to look for any clinical guide posts, we must consider the frequency first, of all ovarian tumors, and then that of solid tumors. At the Brooklyn Hospital from 1908 to 1923 (inclusive), there was encountered a total of 333 ovarian tumors. Of these there were:

Cystomata	237 or 71.1 per cent
Dermoids	21 or 7.2 per cent
Malignant cysts or carcinomata	34 or 10.2 per cent
Benign papilloma	27 or 8. per cent
Sarcomata	2 or 0.6 per cent
Fibromata	5 or 1.5 per cent
Myomata	1 or 0.3 per cent
Endotheliomata	1 or 0.3 per cent
Teratomata	1 or 0.3 per cent
Krukenberg tumors	1 or 0.3 per cent

Ewing considers that serous cystadenomata form one third of the cystic tumors. Pfannenstiel believes 50 per cent of papillary cystic tumors reveal adenocarcinomatous structures in at least some portion of the growth; while pseudomucinous cystadenomata form the majority of the cystic tumors—they rarely become carcinomatous.

In 200 cases of Martin and Libbert the proportions were as follows:

Cystadenomata	55 per cent
Carcinomata	22 per cent
Embryomata	9.2 per cent (including dermoids)
Parovarial	8.4 per cent
Sarcomata	2.9 per cent

Erdmann and Spaulding, in 1921, surveyed 200 cystomata of the ovaries and found 36, or 18 per cent papillary; these figures are not far from the average of many observers, Coblentz giving 10 per cent and Martin and Libbert 27.5 per cent. Of the 36 cases of Erdmann and Spaulding 24 or 66.6 per cent were malignant. Ewing believes that 10 per cent of all ovarian tumors are dermoids.

Among the connective tissue tumors, we again find wide variations as to the frequency. The lowest figures are 1 per cent for fibromata in Eisenstaedter's group; 1.5 per cent at the Brooklyn Hospital in a large series of cases; 2.5 per cent reported by Meigs of Boston, in 1922; and 3.5 per cent by Hoon in 1923 from 4175 ovarian tumors in 11½ years at the Mayo Clinic and Ewing quotes 5 per cent from Kroemer. On the other hand Strong, in discussing a case reported by Dr. A. M. Judd before this Society in October, 1920, said that "fibromata were the commonest solid tumors, even more frequent than sarcomata, which are 5 to 10 per cent of all ovarian tumors." Another unexpected statement, in the same discussion came from Dr. Herman Grad, who said that he had had only one case of solid ovarian tumor and that was one of bilateral sarcomata. Joseph T. Johnson of Washington reported that among 5,000 laparotomies he had found but one fibroid tumor of the ovary. H. C. Coe covered the subject of fibromata over forty years ago, and Reuben Peterson reviewed 82 cases, 21 years ago, but statistics have changed so much since then that these figures are of little value.

Regarding the frequency of sarcomata, we again find wide variations; the rare incidence of 0.5 per cent, in Eisenstaedter's series, 0.6 per cent at the Brooklyn Hospital, 1.5 per cent in Adami and Nichols *Pathology*. Frank gives their frequency at 2 to 5 per cent, Graves says they are very rare, while Miles Porter of Indiana, in a large practice of abdominal surgery feels that they occur in 5 per cent at least. He quotes Bland-Sutton as finding 21 in 100 cases of ovariectomy in young girls.

The other solid tumors, myomata, myxomata and teratomata are so rare as to be negligible in figures.

Of all malignant cases of ovarian tumors, there is, then, a good deal of variation. Bland-Sutton feels that 20 per cent are malignant, Miles Porter agreeing with him. Bertino reports 17 per cent among nearly 470 cases of ovarian tumors, while at the Brooklyn Hospital we found less than 12 per cent. Frank reports primary cancer of the ovary in 10 to 12 per cent, but he must feel that many more secondary cases exist from his radical advice as to treatment.

As to the occurrence of epithelial tumors, Ewing says "all ages are susceptible from birth to senility, but the period of sexual activity, 25 to 35 is most prominent." Most of the carcinomata occur, though the case referred to in the opening paragraph was 19 years old, between 40 to 50 years. This is borne out by many case reports.

Teratomata occur in all ages, most frequently between 30 to 40 years, though often in children, R. H. Harris reporting a case of carcinomatous teratoma in a child six years of age.

In Hoon's review of 55 out of 149 ovarian fibromata, found at the Mayo Clinic, the greater number occurred in the fourth, fifth, and

sixth decades, but the youngest was 18 and the oldest 73. In my own survey of the more recent current literature, these facts seem to hold.

When we consider the occurrence of sarcoma, we then find wide variation in the reports, Downes operating upon a nine months old baby, and one case being reported as found in a fetus. In general, they occur in the young, one out of the two at the Brooklyn Hospital being 13 years of age. Judd reported one before this Society of a girl 16 years of age. It is a very noticeable fact that the standard textbooks of gynecology or pathology give little space to the connective tissue tumors.

Tumors of the uterus and inflammatory conditions of the pelvic organs have a good deal of sameness in the stories presented, especially as to menstruation.

The symptomatology of solid ovarian tumors is again a maze of variability. In the case of R. H. Harris, puberty occurred at five years of age; after the removal of the affected ovary menstruation stopped and did not recur, though the malignancy did 30 months later. This was a teratoma, which is very rare, and includes all three elements of embryonal tissue.

Among the epithelial tumors, Corcia reports in the case of a large papilloma, six months amenorrhea, while others, too numerous to mention, have found menorrhagia and metrorrhagia.

Foerster of Philadelphia reviews 12 cases of his own of connective tissue tumors of the ovary, and found amenorrhea as a prominent symptom, sometimes of several years standing, which, to him, "indicated plainly that the ovary was unable to perform its function."

In Hoon's survey of the 55 cases of fibromata from the Mayo Clinic, he reports that "menstruation is seldom influenced by the tumor."

Going to the other extreme, we find that Fairbairn of London in five very carefully surveyed cases of fibromata finds usually some menorrhagia. Miles Porter in his series, found amenorrhea, menorrhagia and metrorrhagia; amenorrhea occurring in a malignant tumor when bilateral. Leo Schwartz' patient with sarcoma had no menstrual disturbance. Judd in his case of sarcoma reported metrorrhagia, but only for a month.

When we consider pain, again we find great variation in reports, irrespective of their being epithelial or connective tissue tumors. A patient is driven to the gynecologist by the pain of a simple cyst, and yet a malignant tumor is often found from some other symptom, or by chance at operation. Porter usually found pain, and Fairbairn reports simply a dull ache. Leo Schwartz' case of sarcoma of the ovary had only pain as a symptom and that for only four months.

Dysuria, at least to the degree of urgency and frequency and pain, was as common a symptom as I could find. This, however, is explained satisfactorily by the pressure of a hard and frequently heavy mass upon the bladder or ureter.

As frequent a symptom as is reported, is the patient's complaint of increase of size. In the epithelial and in the malignant connective tissue tumors, this is much more rapid than with the fibromata.

The differential diagnosis of solid ovarian tumors from cystomata or from other pelvic growths is not always so hard as the differential diagnosis between benign and malignant solid growths of the ovary.

It would be in the nature of a presumption to fill a paper before this Society with methods of bedside examination and diagnosis. The only caution I wish to bring out is actuated by the lecture of Oskar Frankl before the Royal Academy of Medicine in Dublin in April, 1922, and published in the *Medizinische Klinik* that same year. In that discourse, he states that the frequency of metastatic tumors of the ovary is so great and it so often is so much larger than the primary tumor, that as gynecologists we must carefully consider before an operation upon a pelvic tumor in a woman who has gastrointestinal symptoms. The converse of this caution is advised to the surgeon of the upper abdomen, for the best gastrectomy is of little avail, if particles are dispersed into the ovary.

With the abdomen opened and an ovarian neoplasm visible, palpable and even sectionable, is it possible always to make a diagnosis?

Let me quote from authorities. In discussing a case of sarcoma in the puerperium, reported by Dr. George Brodhead, Dr. George Kosmak said, "In most cancers, the diagnosis is not made until the pathologist's report is received." But is it always then? In April, 1919, the writer removed an apparently solid tumor of the right ovary and it was reported "cystadenoma; no malignancy found." Fourteen months later a tumor of the left ovary with the rest of the pelvic contents was removed, and the report was returned "cystadenoma, undergoing malignant changes." In spite of x-ray therapy, immediately instituted, she died in about a year with an extensive pelvic mass with probable hepatic involvement.

With the abdomen opened, the first observation is made as to ascites. This is not an accompaniment of only malignant tumors, for many authors report it otherwise. For instance, in Eden and Lockyer, we are told it "is formed with large innocent tumors and some varieties of cysts; it is also a common concomitant of papillomatous tumors. Conversely, in malignant tumors, especially those which have not spread beyond the ovary, it may not exist." Graves says it is always present with sarcomata, but it is not a special mark of malignancy, because it is usually present with all solid tumors of the ovary. Miles Porter has found it the rule in malignancy, but not oc-

curring frequently in benign tumors of the ovary; it is present whether malignancy involves the peritoneum or not, and he wonders if it may not be due to increase of peritoneal tissue.

Until we know more of the causation of ascites, it cannot be a reliable symptom. Pfannenstiel ascribes it to a chemical irritation of the peritoneum and Schauta considers it to be due to pressure and stasis of the blood vessels of the parametrium. With these authorities bringing forth views which, while not actually disagreeing, fail so much to coincide, we may only look on ascites with suspicion, with possibly more suspicion if it is blood tinged.

Having considered, with or without satisfaction, the condition of ascites, the operator must note adhesions. Here, there is more unanimity of opinion. If the tumor is yet confined to the organ, with unbroken capsule, adhesions will be rare, whether or not the growth is malignant, but they will develop early if the tumor tissue breaks through the capsule whether it is malignant or benign. Pedunculation, again, is a characteristic that seems indeterminate upon either the malignancy or innocence of tumors.

The physical character of the ovarian tumor itself is of the greatest importance, and is extremely difficult to properly evaluate. In size, there are wide variations reported, especially in fibromata—from those no larger than the ovary itself to two reported before the Obstetrical Society of Philadelphia in April, 1914, one by Outerbridge, the size of an adult head, and one by Laws, the size of a full term pregnancy.

Bertha Van Hoosen reported to the Chicago Gynecological Society a rare case of melanosarcoma, which also had attained the latter size. Judd's case of sarcoma was the size of a grape fruit.

The cystomata that have become physically solid through development of papillomata may attain size limited only by capacity of the abdomen. Indeed, there have been instances in which the papillomata grew up through the diaphragm and down into the vagina!

Their consistency varies as do all the other data about solid tumors. Many have become so cystic through degeneration or liquefaction that they show fluid contents, and merely a shell, while MacCallum says he "has more than once observed bilateral multilocular ovarian cystadenomata composed of such small cysts that the tumors appeared to be almost solid." If pathologists are puzzled by these, what may be expected of clinical surgeons in the hurried tension of the operating room? This same pathologist tells us that the gelatinous contents of some of these definitely malignant tumors resemble the pseudomucin of some adenocystomata!

Serous cystadenomata become physically solid when papillae develop as they do much more commonly than in the pseudomucinous variety. These papillae appear on the surface of the tumor, and give implanta-

tion metastases over adjoining peritoneum. Malignancy, also, develops much more commonly than in pseudomucinous cystadenomata; in the latter, when papillae develop they are scanty low nodules on the inner surface; when they are malignant, large portions of the tumor are solid or opaque. (Ewing).

Ewing describes genuine solid carcinoma as alveolar or medullary in structure, and very rarely, in elderly subjects, scirrhus. The former produce solid tumors, at first maintaining the form of the ovary but later becoming irregular. They are large and, on section, show an opaque uniform texture hooked up by lobulae and cysts, the latter being the result of necrosis and liquefaction, and not of dilatation of alveoli. Frank amplifies this description by calling the color reddish-yellow, and marked by red and brown area of hemorrhage. Necrotic parts have a bacon-like sheen. Scirrhus types of cancer are so hard as to resemble fibromata, the distinction often being impossible to make. Boldt reported a case with a similar appearing tumor, but the case Mills reported (which proved to be secondary) had a tumor, small and white and fibrous in appearance.

M. Rabinowitz has reported an adherent semisolid noncystic tumor that he has classified as adenomyoma but it and endotheliomata are too rare to merit much clinical consideration. The chocolate cysts that Sampson has so well brought to our attention are literally solid tumors—endometrial tissue in the ovary,—but are probably of clinical importance only as to their immediate care, and this is true of the much more common dermoid cysts which physically are so often solid.

The appearance of the connective tissue types of tumor might be considered a matter for easy distinction, but it must be closely observed. Ewing feels that a fibroma arises in a certain portion of the ovary, usually at the lateral pole, while a sarcoma is a diffuse process affecting the whole ovary. Fairbairn found in his five cases later that the ovarian tissue seemed to be distinct from the tumor but, on closer examination, it showed itself spread out on the tumor; the latter usually being dense white masses.

P. J. Reel on sectioning his specimen, refers to the interlacing bands and whorls of fibrous tissue, similar to those seen in uterine fibromata. A number of reporters also refer to these, which seems to me to be of great diagnostic value, and yet Hoon in his series of 55 from the Mayo Clinic, does not refer to them.

Let us refer again to Bland-Sutton who lays great stress on the existence of a capsule. He makes it an almost certain distinction between benign and malignant growths. To quote: "In their most typical forms, ovarian fibroids present easily recognizable characters. They are ovoid and of regular contour, quite smooth, intensely hard, and, as a rule, free from adhesions and unilateral. I have seen both ovaries affected in this way in one instance only. One pole of the tumor is connected

with the ovarian ligament and if the tumor has been bisected in such a way as to include this ligament, a small portion of the normal ovary will usually be detected associated with the ligament. * . * * A little attention to this relation of tumor, remnant of ovary, and ovarian ligament is of much importance, as it affords an extremely simple means of recognition. When the tumor is bisected, the cut surface displays the peculiar whorled disposition which is so distinctive of the hard uterine fibroid, and it agrees with that species of tumor, not only in its microscopic character but also in being encapsuled."

Of sarcoma, Frank's description is the most full; most of them are hard if of the fibrosarcomatous type—softer as the connective tissue elements decrease. Round cell sarcomata are soft, and resemble brain tissue; spindle cell tumors are white and firm. The surface is smooth and slightly nodular, the color is reddish, white and yellow. The shape of the ovary is often retained and the hilus may be retracted like that of the kidney, and adhesions are frequent. On section, hemorrhagic necrotic (dry yellowish) or liquid areas produce a marbled surface; lymphatic dilatation appears as small smooth cavities. Ewing does not greatly disagree with this except that the cystic spaces are more irregular in size and form than in cystadenoma.

According to Ewing, papillary serous cystadenomata are bilateral in 60 per cent of the cases, while pseudomucinous, the least likely to be malignant, are much more so.

He seems to contradict himself when he says that solid carcinomata are usually at first unilateral, metastases and recurrences of the other side are very frequent, and at another place he says that the majority of these tumors are originally bilateral or soon become so.

While he has published a most complete pathology, he makes no reference to the bilaterality of connective tissue tumors. Hoon and other observers feel that they are bilateral in about 2 per cent of cases, but as for sarcomata, Graves feels that 25 per cent are found on both sides. Bertino, investigating 468 cases of ovarian neoplasm in relation to bilaterality among the clinics in Florence, Italy, found 64 bilateral, of which 23 were benign and 41 were malignant. Of 79 malignant cases, 38 were unilateral. This material is fairly large but gives no decisive data.

The most serious question with which a surgeon must concern himself, is malignancy. When, for instance, is a papillomatous cyst, carcinomatous? In many, if not in most instances, the average clinician is not able to determine and indeed even the histogenesis is unknown, and admittedly so by such writers as Williamson and Barris in Eden and Loekyer's *System of Gynaecology*. While MacCallum, the pathologist, feels that many of the papillomata are not histologically malignant, I feel that we, as clinicians, must look more pessimistically, especially on the serous cystadenomata.

While Adami and Nichols wrote considerably earlier than MacCallum, they cannot be controverted when they say, "From the cystadenoma there is a natural transition to the carcinoma, for the epithelial benign tumors of the ovary, especially the cystic forms, are particularly liable to undergo malignant metamorphosis."

Ewing is more pessimistic, as he feels that any cystadenoma after papillomata appear, may degenerate into carcinomata, though he recognizes the greater liability in those of serous origin. He also informs us that carcinoma may develop in a *fibroma*, either from the downward growth of surface epithelium or from the proliferation of glands in a fibroadenoma. Brooke Anspaeh, as a clinician, feels that only by histologic examination can early malignant changes in papillomatous tumors be detected.

Treatment of solid tumors must take two courses. If we have an assured benign tumor, removal of it alone will suffice. If the tumor is malignant *or even suspicious*, I feel that complete pelvic extirpation should be done. I take this stand in the face of statements from Boldt* and from Vineburg who, before this Society in November, 1913, each reported a case of carcinoma of the ovary, and in neither event was there recurrence, one after six years, and the other, nine years, the latter patient bearing a child after the operation.

One of the greatest authorities, Oskar Frankl, believes that with primary cancer, if the ovarian capsule is intact, there need be no fear of implantation tumor—the uterus need not be removed. On the conservative side, we also find LeRoy Broun and Howard Taylor; the latter, in discussing Brodhead's case of sarcoma, felt that a woman anxious to have a child would prefer the risk and not lose the ovary. J. Whitridge Williams, in reviewing Frank's *Gynecological and Obstetrical Pathology*, puts himself on record as against removal of the other ovary in a case of unilateral papilloma.

W. W. Chipman, in discussing a case report of the writer's, in March, 1923, also aligns himself on the conservative side, even though the patient died a year after the operation for a tumor of the second ovary, the first being reported benign and the second "beginning malignancy."

There are many who will support the radical stand in a clear-cut unilateral malignancy, but when we consider observer after observer who warns us of the frequency of malignancy in ovarian tumors, and that the diagnosis of innocence or malignancy is most difficult, and frequently impossible, without the most carefully prepared microscopic sections, why are we not justified in being radical with the suspicious cases? Robert Frank, William P. Graves, Brooke Anspaeh,

*Dr. Boldt now informs me that the patient has since died of carcinoma of the other ovary.

and L. W. Strong would seem to consider that radical surgery would be truly conservative.

If on the other hand, we save a life at times, what have we lost to balance? Some needless sacrifice of ovaries with what is called "unsexing." Most tumors occur after 25 years of age and many if not the majority, occur after 35 years. If no children have come to the woman of the latter age, there is little likelihood of any occurring. In the younger woman, the risk of death or childlessness must be shared by the patient.

Brooke Anspach feels that "the effect of castration is no more serious in women after thirty than the normal menopause. In women before marriage, it interferes with the development of a *libido sexualis*. In women who have been married for some time and in whom the *libido* is matured, there is usually no diminution of sexual feeling. Indeed the removal of diseased and painful ovaries may make coitus more agreeable or at least, less objectionable." Anspach quotes Graves as taking this same stand.

As to methods of operating upon any ovarian tumor, there is one thing that should be axiomatic; it must be removed *in toto*, if physically possible, with no tapping or morecellation. The question of post-operative use of the x-ray or radium must be dependent upon the histology and gross pathology found at operation.

To summarize.—A survey of the literature informs us that solid ovarian tumors are difficult to classify, and to diagnosticate as to malignancy present or future. Treatment may be conservative or radical; in the former event, with grave risk from recurrence, and in the latter event, with the minor risk of sterility and "unsexing."

46 GATES AVENUE.

(For discussion, see page 621.)

ECLAMPSIA—IS IT A BIOLOGICAL NECESSITY?*

By O. M. GRUENZIT, M.S., M.D., DETROIT, MICH.

IN a search for the cause of eclampsia and the explanation of the symptoms and signs of the disease, I am not creating new hypotheses or facts. No doubt exists in the mind of anyone that what has been said about the symptomatology and pathology of eclampsia is true. This paper aims to account for, and to give an explanation of, the concurrent phenomena associated with eclampsia and thus to lead to the answer regarding the etiology of the disease.

Recently,¹ I advanced an idea that the eclamptic status is due to the interagglutination of the baby's red cell elements by the mother's serum. Since this publication, McQuarrie² has presented additional data which confirm my contention. Dienst³ in 1905 advanced a similar conclusion, but later in 1908⁴ retracted this idea and substituted another for it.

Castle⁷ defines heredity as "organic resemblance based on descent." "The son resembles the father because he is a chip of the old block." The mendelian law implies that the individual is made up of unit characters which are transmissible to the progeny. Von Dungern and Herschfeld⁸ demonstrated the presence of different unit characters specific to each blood group, and that these characters never occur in the progeny if not present in one of the parents, and that the blood group peculiarities remain permanent through the life of the individual. Recently, Ottenberg⁹ has diagrammatically presented the possible transmission of the group characters from parents to offspring.

Landsteiner¹⁰ in 1901 postulated the presence of different agglutinating substances specific to each blood group. Deseatello and Sturli¹¹ in 1902, and Hektoen¹² in 1907 proved by the absorption method the presence of two cell agglutinogens and two corresponding serum agglutinins. Jansky¹³ in 1907, definitely recognized four types of blood. This was confirmed by Moss¹⁴ in 1910.

In their embryologic development the red cells acquire agglutinogens first which are usually present at birth.¹¹ The complete blood group type is completely established inside of two years.⁵ Recently Jones¹⁵ claims that blood groups are completely established at birth. In summary, we may say that the heredity determines the blood groups. The essential property which differentiates groups is an

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1922.

interagglutinating power between certain types. Upon this latter property, practice of blood transfusion has been based.

The hereditary transmission of blood group characters from parents to offspring has its limitations. The union of pure types of the same group results in a pure type of the same group. The union of hybrids of the same group results in a blood type according to the Mendelian law of segregation.

If a union occurs between two different pure line groups the offspring is a hybrid with dominating blood group characters of one parent, or with a different blood group in which characters of both parents are present.

In this presentation we are not interested in all the possibilities of group transmissions as presented by Ottenberg,⁹ Jerrell³⁶ and Dyke and Budge.³⁷ What we want is to know those instances in which the baby's blood type is compatible with its mother's. This may occur only in limited blood group union of parents as shown in Table I.

TABLE I

INCIDENCE OF COMPATIBILITY BETWEEN MATERNAL AND FETAL BLOOD GROUPS

The mother's and baby's blood groups are compatible if									
The mother is group	I			and husband is group	I				
"	"	"	"	II	"	"	"	"	I or II
"	"	"	"	III	"	"	"	"	I or III
"	"	"	"	IV	"	"	"	"	I, II, III or IV.

Clashing cannot take place if the parents have the above blood grouping.

Our knowledge of interagglutinability of certain blood groups leads one to question what occurs in instances in which the mother's group is incompatible with her husband's and her baby's group; and whether such incompatibility is not responsible for some of the conditions in pregnancy, especially such obscure diseases as eclampsia, pernicious vomiting, some ideopathic sterility³⁷ cases as well as some miscarriages.

Halban,¹⁶ Happ,⁵ and Martin¹⁷ have noted that the mother's serum may agglutinate in some instances the baby's red cells. Dienst³ says that eclampsia is a result of incompatible blood transfusion. Shawasse¹⁸ states that there is no relation between eclampsia and fetal or maternal "threat." This latter statement contradicts a theoretical conception based upon experience with blood transfusion.

If the union occurs between groups II and III with the resulting offspring of group IV, the serum of either of group II or III agglutinates *in vitro* cells of IV. We presume that similar agglutination could take place *in vivo*. Is there a possibility for the baby's cells to pass into the mother's blood stream? This we do not know, but if we do not challenge the long accepted theory¹⁹ that waste products of fetal metabolism pass into the mother's system for disposition, we must

admit that such may be the case. Or, we may admit that Dienst and Young and Miller²⁰ were right when they assumed that a hemorrhage occurs in the placenta and that through this hemorrhagic area (according to Dienst and McQuarrie) the fetal cells may be poured into the mother's system. The latter statements are purely speculative and can be doubted if we study the history of the onset of eclampsia, especially the preeclamptic cases, where for several weeks we note a gradual progress of the disease. All symptoms gradually advance. With a hole in the placenta, symptoms would occur almost instantaneously.

However it may happen, it is not the purpose of this paper to explain how the elements carrying agglutinating powers pass into the mother's blood stream, whether as the "hypothetical agglutininogen" with a protein molecule or as red cells. The fact remains that to produce the symptoms of eclampsia by the interagglutination the baby's agglutinating substance must be present in the mother's blood stream. This would always occur, as shown in Table II.

TABLE II

INCIDENCE OF INCOMPATIBILITY BETWEEN MATERNAL AND FETAL BLOOD GROUPS

If the mother's type is I	and husband's type is II, III or IV, or
" " " " " II	" " " " III or IV, or
" " " " " III	" " " " II or IV, or
" " " " " IV	she can never have incompatibility of blood with any of the groups.

Interagglutination can never occur if the parents have compatible blood group, as presented in Table I. On the contrary, interagglutination is always possible if the union occurs between parents of incompatible blood group, as presented in Table II.

This remains true in unions of pure types. If the union occurs between pure and hybrid, or between two hybrids, the blood type of the offspring is according to the Mendelian law of segregation and the interagglutination will occur according to the law of chance in segregation. The type of the female's blood, however, plays a great part in the occurrence of interagglutination. Thus, if the female is type I and the male is hybrid II, the resulting offspring may be either type I or II. If the offspring is type I there will be no possibility of interagglutination whether female is type I or II. If, however, the offspring is type II, there will occur interagglutination in 50 per cent of offsprings.

On the contrary, if the male has type I blood and the female is type II with the offspring's type of blood I or II, in no case could the female develop interagglutination, because from the experience on blood transfusion, we know that type II serum does not clash with type I cells.

According to the isoagglutination theory based upon the principle of the Mendelian law of segregation, interagglutination is possible in multiparae upon as many occasions as there occur incompatible segregation of blood types in mother as compared with her offspring. Thus, for instance, according to Ottenberg, if one parent hybrid of type II with one recessive character and other parent of type IV with two recessive character units, of which one recessive is like that of the other parents, their offspring may be 33.2 per cent IV, 33.2 per cent II, 16.6 per cent III, or 16.6 per cent I. In this case if the female is type II there may occur interagglutination with either type IV or type III child, but not with type II or type I child.

The eclamptic syndrome manifests itself with certain clinical phenomena and laboratory findings. The rise in blood pressure occurs first. The headaches, albuminuria and edema follow in the footsteps of increased blood pressure. The blood becomes "thicker," the urea content remains low, while the uric acid content is high. The total nonprotein nitrogen content remains almost undisturbed. The alkali reserve is decreased considerably. The carbon dioxide is manifestly increased.^{21, 22} On necropsy, coagulation thrombi and focal necrosis are found in liver, lungs and kidneys.

There is extreme congestion, stasis and edema in all organs.

Zweifel²³ and Stronganow²⁴ have called attention to the increased blood viscosity in eclampsia as compared with normal pregnancies; however, no explanation has been forthcoming as to the cause for such an increase.

Determann,²⁵ Austrian,²⁶ and Burton Opitz²⁸ have shown that the viscosity of blood is maintained by the corpuscles and dissolved proteins. Salts, carbon dioxide and lacking of corpuscles increase viscosity greatly.

In normal pregnant women the blood volume is increased by about 15 per cent of the total volume²⁷ and consequently the viscosity of the blood of pregnant women is considerably below that of nonpregnant. The average viscosity of nonpregnant women is given by Austrian as 4.5, as compared with distilled water, which is taken as one.

During the last month of pregnancy the viscosity is about 3.4. In these cases of true eclampsia the blood viscosity was 4.5, 5.0 and 5.5. The blood chemistry does not lend evidence to the assumption that the increased viscosity is due to the retention of the salts or the waste products of metabolism.

The increase in viscosity can be experimentally reproduced in the test tube. If normal human serum is mixed with the incompatible red cells, as shown in Table III, the mixture acquires far greater viscosity than the same serum mixed with the same proportions of compatible red cells.

TABLE III

VISCOSITY OF COMPATIBLE AND INCOMPATIBLE SERUM-CELL MIXTURES

COMPATIBLE			INCOMPATIBLE	
SERUM IV AND CELLS IV			SERUM I AND R.C. IV	
SERUM	R. CELLS		WHOLE R.C.	HEMOLYSED R.C.
0.5 c.c. × 0.1 c.c.	2.3		2.40	2.80
" " 0.2 c.c.	3.0		3.80	4.15
" " 0.3 c.c.	3.25		4.70	5.30
" " 0.4 c.c.	4.00		5.30	5.65
" " 0.5 c.c.	4.40		6.50	6.60

The viscosity is further increased if the cells have been previously hemolysed by freezing.

Bailey,²⁸ Erlanger and White²⁹ and Kruse,³⁰ have shown experimentally that the introduction of colloid substances into the blood stream, as acacia or gelatin, elevates the blood pressure and the blood volume and may lead, according to Kruse, to the suppression of urine.

From the data presented, one is justified in assuming that the increased blood viscosity in eclampsia is due to a new colloidal state produced by the interagglutination between the mother's and her baby's blood.

The increased blood viscosity added to the increased blood volume irritates the capillary walls. This undoubtedly is an explanation for the occurrence of spasticity in the capillaries in eclampsia.³² With the rise of blood pressure extra work is placed upon the heart, as it takes more force to pump a larger amount of thick blood against a higher resistance. However, these are not the only predisposing causes found in cases of eclampsia. A number of other factors come into play simultaneously. The blood chemistry^{21, 22} shows an increased carbon dioxide content which indicates that the gaseous exchange between lungs and blood stream is slowed. There is a considerable lowering of the alkali reserve which means that oxidation processes of the body are lowered.

The low urea and slightly increased total nonprotein nitrogen content indicates that the hydrolysis of the proteins is interfered with. Baer³³ and Cornell³⁴ have conclusively shown that the basal metabolism in pregnant women is considerably increased above normal, being about plus 35 per cent. In few cases of eclampsia in which the latter could overcome the difficulties of recording basal metabolism, it is indicated that it is considerably lower than in normal pregnancies, and that it is lower before delivery in eclampsia and may increase after delivery, while in normal pregnancy it is higher before and gradually becomes normal.

Thus, it is more than suggestive that both oxidation and hydrolytic processes are seriously interfered with. This will appear more evident if it is remembered that throughout the body of the eclamptic

there is extreme congestion, edema, and stasis in addition to the coagulation thrombi and focal necrosis in all organs.

In summary, the pathologic changes in eclampsia can be explained satisfactorily on the basis of the new colloidal condition in the mother's blood stream which is produced by the interagglutination between the maternal and fetal blood. This results in a "thick" blood which calls forth an increase in blood pressure, spasticity of capillaries, general edema and stasis. In its turn, the body is not able to hydrolyse quickly enough the end-products of agglutination. The oxidation processes are slowed and the end-result is lowered metabolism, increased acidosis and the accumulation of carbon dioxide in the blood stream.

EXPERIMENTAL AND CLINICAL FINDINGS

In normal pregnancies the mother's blood type was determined before or inside of twelve days postpartum. The baby's type was determined at birth or inside of two days after birth. A drop of blood was suspended in about one cubic em. of normal physiologic saline. The cells were typed against known types II and III sera by the cover glass drop method of Brem.³⁵ The reading was done immediately and repeated several times for a period of at least two hours. Typing was done at room temperature. The known sera II and III were always checked up against cells of type IV before their use. On the following day, the supernatant saline-serum mixture was poured off and substituted by fresh saline and the typing repeated. In abnormal cases the blood typing was invariably followed by ascertaining the effect of the mother's serum upon the baby's red cells and the baby's serum upon the mother's cells.

It is noted from Table IV that out of 86 cases diagnosed by the clinician as normal pregnancies, there were three cases in which the mother's serum agglutinated her baby's cells. Upon the examination of the hospital record, in one of these cases, the laboratory report

TABLE IV
BLOOD GROUPING IN NORMAL PREGNANCIES

NUMBER OF CASES	MOTHER'S GROUP	CHILD'S GROUP	
38	I	I	normal
18	II	II	"
4	III	III	"
4	IV	IV	"
11	II	I	"
1	II	III	"
2	III	I	"
1	IV	I	"
5	IV	II	"
1	IV	III	"
2	I	II	"

TABLE V
BLOOD GROUPING IN ABNORMAL PREGNANCIES

CASE	MOTHER'S GROUP	CHILD'S GROUP	COMPLICATIONS
1	I	I	Hydramnion. Placenta previa. No convulsions. Para. H.B.P.* Alb.+
2	II	II	Hydramnion. Contracted pelvis. Cesarean section. No convulsions. H.B.P. Alb.+
3	I	I	Postpartum convulsions. II.B.P. Alb.+
4	I	I	Nephritis. Albuminuria. II.B.P. The same with other 4 pregnancies. One slight convulsion with last pregnancy.
5	II	II	Nephritis. Secondary anemia. Cardiac hypertrophy. Alb.+ Same with other pregnancies.
6	I	I	Nephritis, edema. H.B.P. Alb.+ No convulsions.
7	II	II	Far advanced pulmonary tuberculosis.
8	III	-	Myocarditis. B.P. 80/58. Alb.+ Premature. Fetus dead. Blood Viscosity 2.95.
9	II	-	Nephritis, no convulsions. H.B.P. Alb.+ Viscosity 3.4.
10	III	III	Postpartum convulsions. B.P. 140/96. Alb. trace. Viscosity 3.3. Polyuria.
11	III	III	Postpartum convulsions two days following delivery. Polyuria for three months. II.B.P. Alb.+
12	II	I	Postpartum convulsions. II.B.P. Alb.+ Viscosity 3.2.
13	II	II - II	Nephritis. Cardiac failure. Twin pregnancy. II.B.P. Alb.+
14	I	I	Convulsions II.B.P. Trace of albumin. Polyuria.
15	IV	IV	Nephritis. H.B.P. No convulsions. Alb.+
16	II	IV	Eclampsia. Antepartum Convulsions. Cesarean section. Primary Alb.+
17	I	II	Preeclampsia. No convulsions. Alb.+ H.B.P.
18	I	II	Preeclampsia. Postpartum "blue and black, gasped for breath." Pulse went up to 160. No convulsions.
19	I	III	II.B.P. with each pregnancy. Alb.+ No convulsions.
20	III	IV	Eclampsia. Antepartum convulsions. Alb.+ Viscosity 4.5.
21	I	II	Eclampsia.
22	I	II	"
23	II	III	"
24	III	II	"
25	II	III	"
26	II	III	"
27	II	IV	Husband IV. Eclampsia, postpartum 21 convulsions Alb.+ Primipara.
28	II	III	Eclampsia. One antepartum convulsion II.B.P. Alb.+
29	I		Husband IV. Eclampsia. II.B.P. Alb.+ One convulsion intrapartum.
30	II		Husband III. Pernicious vomiting. Aborted at 3 months.
31	I	III	B.P. 220/110. Alb.+ No Convulsion. Viscosity 5.5 Preeclampsia.

*H. B. P.=High Blood Pressure.

showed albumin in the urine, which disappeared four days following delivery. This would indicate that this case was an undiagnosed pre-eclamptic and properly should have been classed under abnormal pregnancies. In two other apparently normal cases the blood grouping was incompatible. No laboratory record was available in these two cases. In the remaining 83 normal pregnancies selected at random, the blood grouping between the mother and her child was such that it could not produce interagglutination.

If we study the blood grouping in abnormal pregnancies as shown in Table V, it will be noted that in hydramnia and nephritis without convulsions, the blood grouping between mother and her child is compatible, though in all of these cases the blood pressure was high and albumin was present in the urine.

There is a group of cases which clinically resemble eclampsia and, for the most part, are diagnosed as eclampsia, but have compatible blood type and the blood viscosity is low. The true eclampsia is understood to have high viscosity of blood. In three cases of eclampsia examined, the viscosity was high, 4.5, 5.0 and 5.5 respectively, while in the normal pregnancies the viscosity was on the average of about 3.4. This would indicate that toxemias of pregnancy fall into two groups; namely, the nephritic toxemia in which blood groups between mother and child are compatible and the blood viscosity is low; and the eclamptic toxemia or more properly isoagglutination toxemia which occurs when the maternal and fetal blood groups are incompatible and the viscosity is above normal for pregnant women.

TABLE VI
VISCOSITY OF BLOOD IN NORMAL AND ABNORMAL PREGNANCIES

8583	Normal	P-2	B. P. - 130/92	Alb. - neg.	3.1
8625	"	P-1	" - 118/75	" "	3.6
8629	"	P-2	" - 120/75	" "	3.4
8667	"	P-4	" - 110/70	" "	3.3
8679	"	P-2	" - 130/80	" "	3.4
8085	Nephritis without convulsions. H.B.P. Alb. +				3.4
Kils	Nephritis with postpartum convulsions H.B.P. Alb.+				3.3
7911	Myocarditis, secondary anemia. Low B.P. Alb.+				3.3
8326	Chronic nephritis with retention and cardiac de-compensation.				2.90
8361	Nephritis with postpartum convulsions H.B.P. and polyuria.				3.2
Edw.	Chronic nephritis. H. P. B. Alb. +				2.8
8060	Eclampsia, isoagglutination toxemia.				4.5
11651	Preeclampsia, isoagglutination toxemia.				5.0
8594	Convulsions, H. B. P., polyuria; Alb. trace				3.1
8658	Preeclampsia. B.P. 220/110, Alb. +. No convlsions.				5.5

We note from Table VI that normal pregnancy is associated with low viscosity. The complications of pregnancy, as nephritis, hydramnion and cardiac diseases tend to fluctuate around the normal pregnancy viscosity of blood. Secondary anemia tends to lower the

viscosity of blood below the normal average for pregnant women, which is in agreement with the findings by Austrian.²⁶

It is evident from the experimental data that in normal pregnancies compatibility of maternal and fetal groups is a rule. An incompatibility may occur without severe symptoms, but such occurrences are rare and far between.

In nephritis blood grouping has no relation to the disease.

In true eclampsia the interagglutination between maternal and fetal blood groups occurs as a rule.

Blood viscosity in isoagglutination toxemia is high as compared with normal pregnancies.

Blood viscosity in nephritis with or without convulsions remains the same as in normal pregnant cases. The variations which occur due to the other complications still further tend to lower the viscosity of the blood.

Blood viscosity may aid in the differentiation of isoagglutination toxemias from nephritic toxemias.

DISCUSSION

I have attempted to present briefly the theoretical foundation and practical experience of others leading to the formation of new ideas concerning the etiology of eclampsia as based upon the transmission of hereditary factors which invariably lead to the isoagglutination phenomena. It was shown that the incompatibility between two blood groups upon clashing produce in the test tube a new, more viscous fluid. It is assumed that a similar condition would occur *in vivo* upon the passage of agglutinin from the fetus to the mother's blood stream. The viscous colloidal state of blood can account for all symptoms, signs and pathology of eclampsia. The end-result of these changes produce stasis, congestion and decreased rate of metabolism, protein as well as carbohydrate.

Experimental data on the blood typing from normal and abnormal pregnancies further tend to substantiate that the interagglutination may be at fault in true eclampsia, but not in nephritic toxemias or normal pregnancies.

There is a group of toxemias which have low blood viscosity, compatible blood grouping and approximately the same blood findings as in true eclampsia. These cases may show no suppression of urine, in fact some may have considerable polyuria before and after delivery. The casts and small or large amount of albumin may or may not be present before the onset of convulsions. After the onset of convulsions, albumin and casts in urine increase considerably with each successive convulsion. Clinically these cases are difficult to differentiate from the true eclampsia unless one ascertains the viscosity and the

blood type between the mother and child or her husband. These cases probably belong to the type of "nephritic toxemia."

In fifteen clinically diagnosed cases of eclampsia or preeclampsia, the blood grouping in mother and her child was incompatible. In five cases of pregnancy toxemia with convulsions, blood grouping of the mother and her child was compatible. In eighty-three cases of normal pregnancies blood grouping was compatible.

SUMMARY

The laws of heredity determine the blood group of the offspring.

The incidence of incompatibility between maternal and fetal blood groups is limited and may occur only in limited blood group unions of parents.

In normal pregnancies examined the blood grouping was such as to exclude the possibility of interagglutination between the maternal and fetal blood.

In the majority of clinically diagnosed cases of eclampsia the maternal and fetal blood grouping was incompatible.

High blood viscosity was found in eclampsia with incompatible maternal and fetal blood.

Low viscosity and compatible maternal and fetal blood was found in the "nephritic type of toxemias."

The high viscosity of blood in isoagglutination toxemias probably is due to the passage of incompatible blood elements from the fetus into the mother's blood stream.

The new colloidal condition of blood in eclampsia produces congestion, stasis and edema which are followed by lowered body function in general and especially of basal metabolism. As a sequence to the lowered metabolism hydrolysis of proteins and oxidation processes of carbohydrates compounds are slowed. This leads to the appearance of acidosis. The thick blood and spasticity of the capillaries lead to high blood pressure, stasis, edema, acidosis and convulsions.

BIBLIOGRAPHY

- (1) *Gruhzit, O. M.*: AM. JOUR. OBST. AND GYNEC., 1923, v, 400. (2) *McQuarrie, S.*: Bull. Johns Hopkins Hosp., 1923, xxiv, 51. (3) *Dienst, A.*: Zentralbl. f. Gynäk., 1905, xxix, 353. (4) *Dienst, A.*: Arch. f. Gynäk., 1908, lxxxviii, 314. (5) *Happ, W. M.*: Jour. Exp. Med., 1920, xxxi, 316. (7) *Castle, W. E.*: Heredity in Relation to Evolution and Animal Breeding. N. Y., 1911, A. Appleton and Co. (8) *Von Dungern and Hershfeld*: Ztschr. f. Immunitätsforsch., 1910, vi, 284. (9) *Ottenberg, R.*: Jour. Immunol., 1921, vi, 363. Jour. Am. Med. Assn., 1920, lxxviii, 883. (10) *Landsteiner*: Wien. klin. Wchnschr., 1901, xiv, 1132. (11) *Descatello and Sturli*: München med. Wchnschr., 1902, lix, 1090. (12) *Helstoen, L. J.*: Jour. Infec. Dis., 1907, iv, 297. (13) *Jansky*: Klinik Sbornik, 1907, viii, 85. (14) *Moss, W. L.*: Bull. Johns Hopkins Hosp., 1910, xxi, 62. (15) *Jones, B. B.*: Am. Jour. Dis. Child., 1921, xxii, 586. (16) *Halban, J.*: Wien. klin. Wchnschr., 1900, xiii, 545. (17) *Martin, E.*: Zentralbl. f. Bakteriöl u. Parasitenk., 1905, xxxi, 704. (18) *Chavasse*: British Med. Jour., 1921, i, 641. (19) *Howell*: Physiology, Phila., 1918, W. B. Saunders Co. (20) *Young and Miller*: Brit. Med.

Jour., 1921, i, 486. (21) *Killan and Sherwin*: AM. JOUR. OBST. AND GYNEC., 1921, ii, 6. (22) *Clifford White*: Brit. Med. Jour., 1920, 976. (23) *Zwiefel*: Monatschr. f. Geburtsh. u. Gynäk., Jan., 1923. (24) *Stroganow*: Jour. Obst. and Gynec. Brit. Emp., 1923, iii, 1. (25) *Determann*: Ztschr. f. klin. Med., 1910, lxx, 185. (26) *Austrian*: Bull. Johns Hopkins Hosp., 1911, xxii, 9. (27) *Gneissas and Wanner*: Schweiz. med. Wehnschr., 1922, iii, 1173, 1216. (28) *Baylis, W. M.*: Pharm. and Exp. Therap., 1920, xv, 29. (29) *Erlanger, J., and White H.*: Am. Jour. Physiol., 1920, liv, 1. (30) *T. Kruse*: Am. Jour. Physiol., 1919, xl, 137. (31) *T. Kruse*: Am. Jour. Physiol., 1920, lii, 195. (32) *Hinselmann*: Arch. f. Gynäk., 1923, cxvi, 1107. (33) *Baer, J. L.*: AM. JOUR. OBST. AND GYNEC., 1921, ii, 249. (34) *Cornell, E. L.*: Surg. Gynec. and Obst., 1923, xxxvi, 53. (35) *Brem, W. F.*: Jour. Am. Med. Assn., 1916, lxxvii, 191. (36) *Jerrell, L.*: Norsk. Mag. f. Laegevidensk, 1923, lxxxiv, 449; ab. Jour. Am. Med. Assn., 1923, lxxx, 870. (37) *Dyke, S. C., and Budge, C. H.*: Proc. Roy. Soc. Med. (See Path.), 1923, xvi, 35. (38) *Burton-Opitz*: Am. Med., ii, N. S., 1907, p. 179.

(For discussion, see page 620.)

TWO CASES OF RECURRENT CYST ADENOMA OF OVARY*

BY DAVID HADDEN, M.D., F.A.C.S., OAKLAND, CAL.

IN reviewing the literature on the subject of papillary cystadenomas of the ovary I find few references to cases in which a recurrence has followed operation.

It is generally recognized that the condition is frequently bilateral, and may develop in the second ovary notwithstanding the fact that at the primary operation that ovary seemed normal, and that a complete removal of ovaries and uterus is advisable.

Another fact that stands out, rather negatively than otherwise, is the uncertainty as to whether or not the papillary masses when exposed to contact with the peritoneum, will develop independently of the ovarian structure. The advice given is, in every case possible, to remove the cyst without rupture or even puncture for reducing the size of the mass, as the danger of such transplant is great. Yet the literature does not seem to bear out such a liability in the majority of cases and the reported cases place those that do transplant in the group of cysts of a carcinomatous nature.

There is a rather marked absence in the literature of case reports where a second operation has followed for a recurrence, what condition was found and the final outcome.

A brief description of two cases may be of interest and value.

In 1917, Mrs. A., aged fifty-seven, was referred to me by an internist. She had a tremendously distended abdomen and the abnormal contents were crowding down on the uterus, bladder and rectum, interfering seriously with function.

In the spring of the same year she had a gall bladder operation by one of our best surgeons, at which time no pelvic disturbance presented. She returned to him a few months later with an enlarged abdomen caused by an ovarian cyst. The cyst was unruptured and was removed without disturbing its contents. Recovery was uneventful. Within the next three months the abdomen gradually increased in size until in December, when I saw her, the pressure was practically unbearable.

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

Believing that I was dealing with a recurrence of the papillary growths probably arising as a general peritoneal involvement, and realizing that the fluid material was probably gelatinous and could not be removed by tapping, I opened the abdomen.

The whole abdominal cavity was filled with an enormous amount of thick gelatinous masses that had to be scooped out by hand. When sufficient of this material was removed, the tumor itself presented the appearance of a mass of fibrous tissue spreading throughout the abdominal cavity, but all the strands having their origin in the pelvis, and this connective tissue closely enmeshed with the jelly.

The tumor had recurred on the side from which the ovary had been removed, had burrowed its way between the layers of the broad ligament and practically replaced the uterine structure. The left ovary was not involved. I removed the mass from the pelvis as completely as possible going well beyond its limits on the peritoneum. The anterior surface of the rectum was the only peritoneal structure involved that I was unable to remove. The pelvis presented on completion of the operation all the vessels and the ureters exposed without peritoneum covering. A loose gauze pack was placed to keep the intestines away from the raw surfaces, the ends protruding through the vagina. This gauze was removed some days later and a radium application was made to the surface of bowel through the vagina. The abdominal wound closed without drainage, healed by first intention. The patient has been and is now, in splendid physical condition. In this case there was no evidence whatever of any papillary transplants on the general peritoneum.

The second case came into my hands last December. The woman was forty-three years of age and the mother of one child. She gave a history of an operation thirteen years before for a growth in the abdominal wall.

In April of 1922, she was operated upon in New Mexico for a cyst of the right ovary. The husband reports that at that time the abdomen was found filled with gelatinous masses and that the tumor arose from the right ovary. The surgeon gave him no hope for complete recovery, as he expected the papillary masses would recur from the general peritoneum.

This patient was comparatively well for six months when the abdomen began to enlarge rapidly and she complained of severe pain in the left upper abdomen. For six weeks prior to consulting me, she had submitted to the new fangled treatment originated in our adjoining city and now attracting so much general attention. Her husband realized that her condition had grown progressively more serious during these weeks and finally persuaded her to consult me.

Operation the next day showed the tremendously distended abdomen filled with thick gelatinous material. The filiform projections of the tumor, almost like a mass of seaweed, were running all through the cavity but with no attachments to the general peritoneum. The left ovary was the site of the growth. The uterus was normal and the right broad ligament not involved.

Complete hysterectomy with drainage through the vagina comprised the operation. The condition of the patient making her a bad operative risk, the complete removal of the gelatinous masses was made impossible. However, over five gallons was scooped out. For some weeks these masses continued to work their way through the vagina.

An application of radium was made in the vault about a week after operation. Some four weeks later a vesicovaginal fistula developed. I do not feel that the radium can be blamed in this case, but rather that the general breaking down of the tissue due to the decomposing masses of gelatinous material which were being extruded from time to time was the cause, some of these masses being as large as a fetal head.

Last May I repaired the fistula and obtained primary closure. The tissues of the vagina and vault presented at that time a perfectly healthy appearance.

I feel that these cases are interesting mainly from the standpoint of showing no peritoneal transplants, and also that operative procedures are to be considered as by no means hopeless.

OAKLAND BANK OF SAVINGS BUILDING.

ABDOMINAL HEMORRHAGE FROM RUPTURED GRAAFIAN FOLLICLE CYST*

BY DAVID HADDEN, M.D., F.A.C.S., OAKLAND, CAL.

THAT abdominal hemorrhage from a rupture of a cyst of the ovary or a graafian follicle is comparatively rare, is emphasized by Emil Novak, in a paper from the Gynecological Department of the Johns Hopkins University in 1917. In that article he records only forty reported cases, including his own, up to that year. In order to add the following case to the records as well as to emphasize the similarity of such a pathology to an acute appendix, I am presenting this history.

Miss C. U., aged twenty-eight, a Russian, in good general health prior to the attack, complained of severe acute abdominal pain with vomiting. For four days prior to the attack she was badly constipated and the evening before, was given an enema by her mother. Shortly afterward she was seized with acute abdominal pain, vomiting followed and persisted until morning, when I first saw her.

Physical examination showed a tender and rigid right side with the signs most marked in the region over the cecum. The left abdomen was flaccid with no tenderness. The temperature was 100 with a pulse rate of 87; the white cell count 10,500 with 78 per cent polynuclears.

Pelvic examination showed a normal uterus and no indication of ovarian complications.

A right-sided gridiron incision was made and upon opening the peritoneum the abdomen was found full of bright blood. Realizing that the appendix was not the site of the hemorrhage I made an investigation of the pelvis. The right ovary was healthy but the left, found in proper position, was bleeding very freely from a ruptured graafian follicle cyst about a half inch in diameter.

The appendix presented some indication of a chronic inflammation but not of sufficient severity to account for the right-sided rigidity and tenderness. The bleeding of the ovary was controlled and the appendix removed. Recovery was uneventful.

Questioning the patient more fully after operation in order, if possible, to determine the cause of the injury since the time of the attack was postmenstrual, I found that the tip used in giving the enema was the vaginal type of black rubber of large caliber, and that the patient experienced considerable pain on the left side upon its insertion.

The rate of bleeding from the ruptured follicle was of such degree that in time the patient would certainly have presented symptoms of abdominal hemorrhage, but the primary symptoms were those of a beginning acute appendix.

OAKLAND BANK OF SAVINGS BUILDING.

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

REPORT OF THE COMMITTEE ON MATERNAL WELFARE TO THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS, 1923*

IN 1921, at the St. Louis meeting of our Association, a resolution was offered for the appointment of a Committee on Maternal Welfare, and in 1922, at Albany, the first report of the Committee was presented, formulating the general scope of the work to be accomplished. This included a comprehensive scheme of propaganda to be carried on in conjunction with a similar committee of the American Gynecological Society, under the chairmanship of Dr. Fred L. Adair, of Minneapolis, who has long been enthusiastic to improve obstetric conditions. His efforts, together with those of the late lamented Dr. Sedgwick, have given to Minneapolis a conspicuous place in regard to improved statistics in both maternal and infant welfare.

Our report for 1922 was printed in the *AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY*, for June, 1923.

A conference of the Committee, consisting of Dr. Henry Schwarz, of Washington University, St. Louis; Dr. George W. Kosmak, Editor of the *AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY*, New York, and the Chairman, concluded that the report for this year should consist of a questionnaire survey of the work already done in various centers of population, both urban and rural, in prenatal care, in improved technique and in follow-up work. In this way, we shall determine if any substantial improvement can be appreciated in statistics of maternal morbidity and mortality.

It was further suggested that next year the Committee, in joint action with that of the American Gynecological Society, take up the question of uniform nomenclature in obstetrics; also a discussion of the proposition, which is now being agitated in several states, as to the advisability of the movement to substitute graduate nurses for midwives to attend cases of confinement, in such communities as are not provided with physicians.

An undertaking so vast in its possibilities, as this inquiry into maternal welfare, is appreciated as a most difficult and delicate one. The opportunity to improve conditions must be grasped as a constructive and helpful program, and not as destructive criticism. The aim of the Committee is to lay before the Association the assembled facts, in a purely impersonal and instructive manner.

The remedy of conditions must be applied according to the value of these facts, and their adaptability by the individual physician to his community.

To this end the records of work, the experience and the opinions of obstetricians, health authorities and welfare workers were sought. Five hundred letters, in addition to those sent to our own fellows, were mailed to Boards of Health of states and cities, to welfare organizations, to medical journals, and to individuals supposedly interested in maternal welfare. A comparatively small number of replies was received.

Those who have been willing and able to assist the Committee have our grateful thanks, and to them we make acknowledgment. To the others, the hope is expressed that they will join future committees in the endeavor to extend the work of publicity, which is so essential in this field.

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

Insofar as possible, throughout the report, all deaths from puerperal causes are classified under the International List of Causes of Death (Second Revision, 1909). All puerperal causes comprise the causes of death classified under International List Titles, 134 to 141 inclusive, and puerperal septicemia comprises the cause of death under the List Title 137. Other puerperal causes comprise those classified under Titles 134 to 141, excluding puerperal septicemia. However, since the great majority of statistics in this country are based on the rate per 1,000 live births, a part of the figures quoted are on that ratio, instead of the 10,000 ratio.

Many of the statistics herewith quoted are from the tables and charts furnished by Dr. Anna E. Rude, of the Children's Bureau, Department of Labor, and the Committee expresses its appreciation of her repeated courtesies.

In order to have an intelligent method of comparison of the relative position of our states and cities, the records of Birmingham, England, are taken as a standard. Due to long and active efforts at prevention, Birmingham has the lowest rate of morbidity and mortality of any large city in the world. That city, according to the Bulletin, Department of Health, New York City, May 1921, during the years 1915 to 1921 shows a death rate from puerperal causes averaging 31.94 per 10,000. These figures should be kept in mind.

One of the first publicly analyzed experiments in prenatal care was begun in Boston, in 1909, with the House Cases of the Boston Lying-In Hospital, and continued during the five years before that institution opened its own prenatal clinic.

In that year there were carried to the onset of labor 1,512 patients without a death, and in the first year only two miscarriages; in the first half of the second year one miscarriage, and never another. The rate of stillbirths was about half of that of the city at large. The rate of premature births was reduced to 0.7 of 1 per cent, and the neonatal deaths were from one-half to one-third of the death rate of the city at large.

Dr. Franklin S. Newell sends the figures covering the prenatal work of the same clinic for another five years' period, 1917 to 1921 inclusive, and also the figures for another of the larger maternity hospitals in Boston for the same period. These are in regard to eclampsia, and show the value of prenatal care.

	BOSTON LYING-IN	MASSACHUSETTS HOMEOPATHIC
Total number of confinements	11,180	9,579
Number of cases of eclampsia	43	48
Number of cases developing eclampsia		
who received care in hospital clinic	7	13
Number of deaths from eclampsia	11	19

Of the 11 who died in the Lying-In, only one had received prenatal care; and of the 19 who died in the Homeopathic clinic, only two had received prenatal care.

The City of Boston has had a high maternal mortality rate. In 1921 one mother died in every 130 births. This is the third highest rate in the 15 largest cities in the United States, being exceeded only by New Orleans and Cincinnati, as stated by Dr. Julius Levy in the American Journal of Health, February, 1923.

The maternal death rate in Boston has been continuously decreasing during the last five years, except in 1918.

The report of the Instructive Nurse Association shows that prenatal care lowered the infant mortality 60 per cent and the stillbirth rate 44.5 per cent in the cases that came under their observation, in comparison with those that did not have such care.

Dr. Charles A. Pratt, New Bedford, Massachusetts, reports from a smaller center, showing the universal result of prenatal care, that in the New Bedford Hospital, 1922, there were 534 births with only one case of puerperal sepsis, which recovered; one death from placenta previa and two from cesarean section. In St. Luke's Hospital, with the private obstetric patients of 80 men who constitute the associate staff, no sepsis occurred in 1922. Dr. Pratt says: "Since the advent of rubber gloves, I do not again expect to see a temperature go above 100."

Dr. G. H. Noyes, Providence, Rhode Island, reports that Rhode Island, as a State, is conducting no program of maternal welfare work; that the City of Providence is doing nothing directly to educate its women regarding the importance of prenatal and skilled obstetric care.

Providence, in 1922, recorded 6,517 births, with only 34 maternal deaths, 0.5 of 1 per cent; stillbirths, 3.7 per cent; of the deliveries 19 per cent were conducted by midwives, with 10 stillbirths and 4 cases of sepsis. No death rate is given.

Bristol, Rhode Island, reported 178 births in the first half of 1923, of which 37 per cent were conducted by midwives, or had no attendant. In this group there were no maternal deaths and 3 stillbirths.

The State of New York, 1915 to 1921 inclusive, shows a death rate from all puerperal causes averaging 54.9. In New York City the rate was 46.1. Puerperal septicemia mortality in New York City, for the same period, was 30 per cent of the total mortality. Maternal mortality from all causes varies but little in New York State; while there was an increase in 1918, due doubtless to the prevalence of influenza, the average for the five years was 14.4.

In puerperal sepsis in 1919 New York City showed the world's low record of 11.4 per 10,000; in this being conspicuously under Birmingham, with 15.9 per 10,000.

In 1922 the new Division of Maternity, Infancy and Child Hygiene, established by the Legislature of New York State, began its activities. We are favored with a copy of the recent letter of transmittal by Dr. Otto R. Eichel, Director, to the late Dr. Hermann Biggs, Health Commissioner of the State, under whose auspices the Division was developed. The report includes an analysis of the five years, 1916 to 1920 inclusive, and comprises the record of 1,191,130 live births and 50,552 stillbirths, of which 680,130 live and 31,352 stillbirths occurred in New York City. Maternal and infant mortality include statistics based on live births and stillbirths combined, and must be taken as the ratio of death from all puerperal causes, per 10,000.

New York City occupies a position which is unique in regard to maternal and infant welfare. By its elaborate system of development of Health Centers, under the Department of Health, results commensurate with the outlay of endeavor and money are at once apparent.

The Clearing House of the Maternity Centers of the City is one of the economic factors in keeping the work organized, and the records uniform. It affords an agency of dissemination of information under a single control. This feature has doubtless aided the constituent members of the organization to simplify their work. Up to December, 1919, it was found that 21,014 cases had been cleared, and that 3,210 of these had been reported by two different bodies. In other words, duplication has now been prevented.

The Clearing House offers its services to the population at large, both to those who can afford to pay and to those that cannot following the same methods of reducing maternal and infant mortality that the leading obstetricians observe among their private patients. It was not organized primarily to collect statistics proving the value of prenatal care, but to carry on an experiment in preventive

medicine, differing from hospital administration, in that the cases are not actually handled through the pregnancy and puerperium. Maternal mortality of 40 per 10,000 is evinced as an argument as to the results obtained, being about 10 better than the city rate.

Interesting results are reported from Brooklyn. In a "Study of 2,000 Cases," 1922, the Prenatal Supervisor of the Visiting Nurse Association of that city, finds that among the 1,002 babies whose mothers had received prenatal care, there were 22 neonatal deaths and 25 stillbirths. Among the 1,001 cases that had no prenatal care, the number rose to 41 neonatal deaths and 35 stillbirths. Here prenatal care saved over one-half the babies, as compared with Brooklyn's mortality in general.

The report of Dr. Alfred C. Beck, of Brooklyn, in a paper, "End Results of Prenatal Care," gives a table of comparisons of three series of 1,000 cases each, with the following results:

Series 1. No prenatal care—stillbirths 35; infant deaths 41; total 76.

Series 2. Visiting nurse, but no physician—stillbirths 25; infant deaths 22; total 47.

Series 3. Prenatal care throughout, under medical supervision—stillbirths 19; infant deaths 6; total 25.

In other words, in the last series 1.9 per cent of cases ended in stillbirths and 0.6 per cent died under 14 days, a total of 2.5 per cent. These records are from the Long Island Hospital Clinic. They were under the control of Dr. Beck and Dr. Polak, with a corps of the Visiting Nurse Association, who made home visits.

From the Department of Health, Connecticut, Dr. A. E. Ingraham writes, (August 14, 1923) that the organization of maternal and infant welfare will be completed and a report made next year. The Children's Bureau, Connecticut, gives a mortality of 68 per 10,000 in 1921.

Michigan reports for 1922 a maternal mortality of 67 per 10,000, and infant mortality of 74.7 per 10,000, as compared with 63 maternal and 79 infant mortality in 1921.

Detroit reports, through the epidemiologist of the Detroit Department of Health, that, "It is humanly possible to cut down the deaths in early infancy. The results of our prenatal work in Detroit indicate what it is possible to accomplish. Catering to people in the less well-to-do sections of the city, and among whom unfavorable complications were only too frequent, it was possible to keep the infant mortality rate during 1919 and 1920 down to 78. (The infant mortality rate in the city of Detroit, as a whole, was 96.7 in 1919, and 104 in 1920, while it dropped to 83 in 1921.) By extending the privilege of physical examination and advice to the prospective mother, it is felt that many unnecessary deaths of babies during the first month of existence may be avoided."

Michigan has only begun to be organized under the Sheppard-Towner Act.

A graphic chart of Milwaukee's report for 1922, compiled for the Committee, by the courtesy of Dr. Thompson, Secretary of the Health Department, at the request of Dr. Henry C. Davis, Secretary of the Obstetrical Section of the American Medical Association, shows that while Milwaukee's increase in population in ten years was 100,000, the birth rate in 1922 was the lowest since 1910; that while the percentage of cases delivered by physicians increased from 39 to 84 per cent, and those delivered by midwives decreased from 39 to 13 per cent, and that while hospital deliveries increased from 2 to 25 per cent, there was no lessening in the maternal death rate in the period 1912 to 1922. Maternal mortality averaged for the ten years 39.8, being 39 in 1912 and 39 in 1922.

In a recent experiment in Minneapolis, covering 20 months, in a section of the city "where the midwife had previously held full authority," a group of women

were supervised during pregnancy by the Infant Welfare Society and its attending physicians. "Out of 1,545 births in the northeast section during that period, 32 died in the first two weeks; but out of 157 prenatal cases cared for in the clinic none died in the first two weeks. The stillbirths in the group attended were 50 per cent less than were reported in the city at large."

An advance information manuscript chart, prepared by the Councilor of the 10th District of Maternal and Child Hygiene of Ohio, Dr. Sylvester J. Goodman, Columbus, and received through his courtesy, gives the statistics relative to maternal mortality, from all causes, in the 48 cities of Ohio having a population of 10,000 or over. The figures on the 5 largest cities follow:

	PUERPERAL SEPSIS			ECLAMPSIA			ACCIDENTS OF LABOR			CESAREAN SECTION		
	1920-1921-1922			1920-1921-1922			1920-1921-1922			1920-1921-1922		
Cleveland	34	65	28	25	24	24	25	21	15	14		5
Cincinnati	36	24	13	14	11	10	9	5	10		3	
Toledo	22	28	11	7	11	9	11	5	9		2	3
Columbus	16	16	12	9	10	5	13	2	6		3	5
Dayton	10	12	9		5	5	13	2	6			3
Total for State	279	259	111	106	107	105	127	67	78	36	8	25

A gratifying decrease in puerperal septicemia will be noted, while no improvement in toxemia nor the accidents of labor are recorded.

Dr. A. J. Skeel, one of our Fellows in Cleveland, is in charge of a large welfare district in Ohio, and gives a vivid report of its activities. Then branches of the University Medical School Dispensary, in cooperation with the Public Health Bureau, have been set to work in prenatal care and follow-up work.

This is in conjunction with the extension organization of the state, through the Advisory Committee of the State Department of Health. This committee appointed by the Director of Health, includes a prominent obstetrician for each of the large cities, Cleveland, Cincinnati, Toledo, Columbus and Dayton; also representatives of the Graduate Nurse Association, the Public Health Society, the Ohio Hospital Association and other organizations interested in public health.

A conference, held May 11, 1923, under the State Director of Health, Dr. John E. Monger, at Columbus, laid plans for the operation of the Sheppard-Towner Act in Ohio. It was definitely stated that the intention of the Public Health officials was to carry out the provisions of the law, in such manner, that the personal relation of the practitioner and his patient should be preserved, and in no wise disturbed.

A series of demonstrations are being held under the auspices of the Bureau of Child Hygiene, of the State Department of Health, cooperating with local health authorities, in communities where desired, and special consideration is given to hygiene of maternity and infancy. These demonstrations are to be continued for sufficient time to determine their efficacy, and then it will be decided if they be made a permanent work. Before actual proceedings were begun, it was considered advisable to call conferences of County Medical and County Dental Societies, to present the object and scope of the proposed demonstration; to make a preliminary survey of each community as to its local problems and facilities; to arrange for central office space for cooperative assistance from professional and social groups; to arrange for meetings at various times, of public officials and volunteer organizations, in order to adopt plans for permanent work.

Indiana shows a dearth of maternal welfare work, since the prenatal program has been but recently laid out.

From Ft. Wayne, Dr. L. P. Draper, Department of Health, reports that maternal mortality fell from 87 in 1920 to 63 in 1923.

Dr. A. M. Mendenhall, Indianapolis, writes that the adoption of the Sheppard-Towner Act by the Legislature, in 1923, will be followed by an administration that will be under the Division of Infant Hygiene, of the Public Health Department. The \$50,000 available in the state is to be spent in education.

The Illinois Department of Public Health reports through its Director, Dr. Isaac D. Rawlings, who, writing July 30, 1923, says that while \$19,000 was received by the Department in June, 1922, as a three months' payment on the contemplated work of the state under the Sheppard-Towner Act, that the Attorney General ruled that the money could not be accepted, except by the action of the Legislature. The Legislature refused to authorize the acceptance, so that it has been impossible to undertake maternal and infant welfare work in the state under the Act during the present biennium.

In a service comprising 40,000 cases in the Chicago Lying-In Hospital, there has been no death from eclampsia of any woman who attended the prenatal clinic, and Dr. DeLee writes the Committee that very few patients developed eclampsia.

A survey of welfare conditions in Chicago was published by the Chicago Community Trust in 1922, showing some improvement in prenatal statistics, which will doubtless be further developed.

Chicago has organized the Infant Welfare Society with 28 stations. This Society by its 1923 report shows that 99,491 visits were made by its nurses in 1922. It spent \$116,000 in welfare work.

A reduction in maternal mortality from 70 to 63, from the years 1920 to 1922 is recorded for the city.

The State of Missouri is not in the Birth Registration Area, and the efforts to improve conditions have been sporadic. In spite of the object lessons of clinics and welfare agencies in lessening morbidity and mortality, little change in statistics is to be noted. The cities are developing some organized efforts and these show a more hopeful outlook.

In St. Louis, an investigation as to the effect of prenatal care, supervised by Barnes Hospital of Washington University, was made under the auspices of Dr. Henry Schwarz and his associates. Of the 334 women applying for free medical attention to be given them during the periods of pregnancy and confinement, 46 received dispensary care only; the other 288 were visited in their homes. Most of the women registered between the fifth and eighth months of pregnancy. a few came to the dispensary as early as the second month. They were instructed in personal and home hygiene, and routine methods were used. The results showed the value of prenatal care. The neonatal rate for the clinic was 3.17 per 1,000 live births. In the City of St. Louis, as a whole the rate was 3.8. The rate of stillbirths was 20 per cent greater in the city than in the clinic.

From a report on Maternal Risk Rate in Kansas City, compiled by Dr. Ralph Wilson, June, 1923, it appears that the total maternal deaths from all puerperal causes in 1922, as given by the Vital Statistics Bureau of the Board of Health, was 73 per 10,000. This is exceeded by Boston having 77, with this remarkable coincidence that these two cities, which have the lowest percentages of births attended by midwives, 2.5 in Boston and 1.6 in Kansas City, are among the four cities with the highest rate of deaths from puerperal sepsis.

At Christian Church Hospital, where all the patients, except emergencies, were under prenatal care through pregnancy, the results of three years' service, as compiled by Dr. C. A. Ritter, were as follows: all puerperal mortality 2.6 per 1,000; no deaths from sepsis; stillbirths at term, all causes, 3.6 per cent; an incidence of cesarean section 2.7, no deaths; premature births, 1.4 per cent. This

record shows a reduction over the annual report of Kansas City in general of 65 per cent maternal mortality, and 40 per cent infant mortality.

Two prenatal clinics, that of the Junior League, now in its third year, and that of the Out-Patient Department of the Kansas City General Hospital, both under the supervision of the Chairman of this Committee, give these results: No maternal mortality is shown in the records of the Junior League, and an infant mortality of 3.1 per cent, the General Hospital's records give a maternal mortality of 4.2 and infant death rate of 59.5, with 11.9 per cent of stillbirths.

It is to be noted that since 1918, the puerperal mortality in the limits of Kansas City has been reduced 40 per cent and the infant mortality 25 per cent.

The report of the maternity service at Stanford University, San Francisco, under Dr. Alfred Baker Spalding, Chief of the Division of Obstetrics and Gynecology, received August 1923, gives a comparison of the results of their supervised clinic with those of the city at large. The city shows 7.4 in 1919, 9.3 in 1920, 6.1 in 1921, of maternal mortality in 1,000 live births; the clinic shows an average for the three years of 4.8; the infant mortality was reduced in the same period from 63 to 47 in the city at large, with only 32 as an average for the clinic.

Dr. Frank C. Ainley, Obstetrician to the Hospital of the Good Samaritan in Los Angeles, reports, August 1923, that from January 1921 to July 1923, there were delivered in this hospital 1,177 patients with a mortality of 4 mothers, 22 stillborn infants and 17 neonatal deaths. He adds that the patients are almost entirely private, and have had some prenatal care under their own obstetricians. These figures include all cases of placenta previa, toxemia, lues, premature deliveries and congenital deformities.

Dr. Ainley, in the same hospital, in less than three years' period, had 578 deliveries with no maternal mortality. His records show 9 stillborn infants and 9 infants died before leaving the hospital.

From Oklahoma comes a report, compiled by Dr. W. A. Fowler, Oklahoma City, in which that new state shows a maternal mortality of 61 per 1,000 births, from all puerperal causes; a stillbirth rate of 5 per cent and a fetal death rate of 93.

In the clinical service of the Oklahoma State University, extending over a period of ten years, there has been no maternal death from eclampsia and only one death from sepsis. Both epidemics of influenza were passed through with no abortion nor maternal deaths among supervised cases.

Fourteen of the States, including Alabama, Delaware, Kentucky, Florida, Michigan, Mississippi, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Utah and Virginia, have decided to include as a part of their program for maternal welfare in the near future, the licensing, supervising and instructing of midwives.

The marvelous achievement of the last decade in maternal welfare is that of the pioneers of better obstetrics in the South, in the men like Dr. Plecker of Virginia, Dr. Leathers of Mississippi, and of Dr. Welch of Alabama, among the negro midwives; and of Dr. Rawlings of Texas among the Mexican midwives.

Through the efforts of Dr. Junius A. Rawlings, in 1920, El Paso, Texas, undertook an unusual piece of maternal welfare work. The population of that city is 40 per cent Mexican, and 65 per cent of the Mexican women are delivered by midwives. Supervision of midwives was instituted by a reorganized City Health Department, now under the direction of Major R. E. Tarbett, of the United States Public Health Service; this included literacy test, physical examination, and instruction in the usage of protective obstetrical methods. The requirement of the report of births to the Health Department is so rigid, that it is estimated that 99 per cent of the births attended are reported.

The city employs a supervising nurse and a corps of nurses to visit the homes in a follow-up work in connection with a prenatal clinic.

From Mississippi, the biennial report, dated June 30, 1923, has been received in advance, by courtesy of the Secretary of the State Board of Health, Dr. Leathers. It deals with the striking problem of the enormous proportion of births attended by negro midwives, and the difficulty of dealing with ignorant, illiterate and superstitious women. However, as the Commissioner states the facts: "There are not enough physicians in Mississippi to attend the maternity cases which develop, and because of the peculiar economic and living conditions the midwife is a necessity." A State Supervisor visited 71 counties in 1921 and investigated 154 white and 2,955 negro midwives. Permits to practice were refused to 55 negro and 6 white midwives. Lectures, demonstrations and conferences with public health officers were held at 110 different points.

The Board reports that 438 mothers died in Mississippi in 1912. Of the births in 1922, it is recorded that 22,741 were attended by physicians, and 22,703 by midwives; 600 had no attendant. Stillbirths numbering 4,670 were reported, which is suggested as one of the reasons that Mississippi has decreased in population, in the last decade. The report stresses the economic value to the state of the loss of these lives of mothers, and the potential citizenship thus lost to the state through the waste of infant lives.

Dr. W. A. Plecker, State Registrar of Vital Statistics, reports that the Commonwealth of Virginia shows some little reduction in septie deaths.

Since 1918 the Legislature has placed under Dr. Plecker's supervision the 6,000 or more midwives who are permitted to practice in the State of Virginia. They are taught elementary rules of midwifery, which are printed in a booklet, "Helps for Midwives." A few simple rules are also printed on the back of their Practice Permit. Obedience to Rule 3, which forbids them to make inside examinations, is most strenuously emphasized.

Two booklets are sent to all newly married women whose marriages are reported to the Bureau, "The New Family" and "Feeding the New Family."

The chief part of the maternal and infant welfare work is now under the supervision of Dr. Mary Brydon, who has the dispensing of the Sheppard-Towner fund. This Department is working especially on the education of midwives and parents, in connection with the State Bureau of Vital Statistics, and following the lines laid down by Dr. Plecker.

A brief resumé of the present status of the Sheppard-Towner Act is herewith abstracted. Forty-two states have accepted the provisions of the Act; and forty-one are now developing a program of education in maternal and infant welfare.

The first money available under the appropriation was portioned among the states in April, 1922. Owing to some delay in decisions in the office of the Comptroller, the payments were generally made in June and July, 1922.

According to the report of Miss Grace Abbott, published in the American Journal of Health, September 1922, the Act intends that the plan of organization shall originate in the state, and shall be adapted to local needs, with the purpose:

1. To secure an appreciation among women of what constitutes good prenatal and obstetric care.
2. To make available the community resources, so that women may have this type of care.

The proposed program is based on a supposed knowledge of what skill is available in different parts of each state, and to what extent that skill is being utilized by the women of the state.

In many states the general lack of facilities is said to require that the Direc-

for must, without the resources which the good city clinic offers, endeavor to create a system to fit the situation, working in virgin soil.

The Federal funds available for the states under the Act are:

- 1.—\$5,000, with no cooperation on the part of the State.
- 2.—\$5,000 to match each \$5,000 put up by the State.

A deficiency Act passed by Congress, March, 1922, made available \$490,000 for the remainder of the year, and for the year ending June 30, 1923, an additional appropriation of \$1,240,000 was voted by Congress.

The states that have not availed themselves of the funds are Maine, Massachusetts, Rhode Island, New York, Louisiana, and Washington. Twelve of the acceptances are by State Legislatures, and thirty by Governors, pending the regular session of the Legislature.

Of the 41 states which accepted payments for 1922, 21 matched their full allotment; 5 matched in part and 11 accepted the \$5,000 without matching.

No uniform action seems to have been taken regarding the expenditure of the money. Some states are trying to correlate the fund to the sections of the state where the largest maternal and infant death rate prevails. Eighteen of the states accepting the Act are not yet in the birth registration area, and maternal and infant mortality records are not complete.

Their plans of work, then have no definite, unified basis of procedure at present. One state, with \$62,000 available, has selected two counties as training and demonstration centers, divided into: (1) City Problems; (2) Small Town Problems; (3) Rural Problems; (4) Mining Camp Problems.

Another state, spending \$176,967, provides for two field physicians, six supervising nurses, four full time nurses and eighty nurses giving half time to maternity and infant field work.

In another state, with \$10,000 of Federal funds unmatched, general education from a central office will be given, and two demonstrations, one in town and one in the country, of the work of a prenatal center, will be put on during the year.

One small eastern state has \$76,808 and plans to reduce maternal mortality by:

1. Instruction of mothers.
2. Investigation of the deaths of mothers attended by midwives.
3. Supervision of midwives.
4. Cooperation with hospitals.

Forty-four nurses will visit the new born and do follow-up work.

Other states make their program more fully educational, employing school nurses during the summer months, for infant welfare work. These are usually those with unmatched Federal funds.

Sufficient data, relative to maternal welfare work through varying agencies, have been presented to demonstrate that prenatal care and hospitalization have invariably reduced the rate of maternal morbidity and mortality, wherever intelligently and persistently carried out.

Maternal welfare has become popular, through the activity of women's organizations, which carried on the propaganda that resulted in the Sheppard-Towner Act, and brought Federal aid to the states.

The enormous funds now available, and being utilized for educational work, along the lines already planned, must greatly augment the influence of the Bureau, and help to realize its purpose, defined in no uncertain terms: "To secure among women an appreciation of what constitutes good prenatal and obstetric care."

Dr. G. W. Kosmak, a member of this Committee, who took part in a symposium on maternal welfare, the report of which is published in the August, 1923, issue of the New York State Journal of Medicine, discusses the prenatal care of

women without hospital facilities. The conclusion of the paper, which, of necessity covers the problem of the great majority of all maternity cases, since only a comparatively small number of women can, with our present capacity of hospital beds and the high cost of hospitalization, be sent to a hospital, is as follows: "Women will never escape what must be designated as the accidents of pregnancy and labor, but they may be spared much of the danger, which is now accepted as being of preventable origin. It is this phase of preventive obstetrics in which organizations, self-constituted and enthusiastic to do welfare work, can find a proper field for their activities. This cannot be successfully accomplished, however, in any community without a lay interest being manifested by persons who will, by a generous philanthropy, provide the means of financial support; and, also, by an interest on the part of semiprofessional organizations, such as associates of trained nurses, as well as women's clubs; and finally by an interested medical profession, willing and ready to lend its aid. All such elements of the lay, the semiprofessional and the professional people, if they co-operate, can bring about an organization powerful for good; and also elastic enough to recognize the responsibility of each class and to accept by agreement that each shall function as an entity, neither invading the prerogative of the other, and thus to impress upon the community its value as a factor in upholding the public health."

Signed, HENRY SCHWARZ, M.D.

GEORGE W. KOSMAK, M.D.

GEORGE CLARK MOSHER, M.D., Chairman.

(For discussion, see page 615.)

ITEM

American Association of Obstetricians, Gynecologists and Abdominal Surgeons

The Thirty-Seventh Annual Meeting will be held September 18, 19, 20, 1924, at the Hotel Statler, Cleveland, Ohio. For any further information, address the Secretary of the Association, Dr. James E. Davis, 111 Josephine Avenue, Detroit, Mich.

Society Transactions

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SIXTH ANNUAL MEETING

PHILADELPHIA PA., SEPTEMBER 19-21, 1923

(Continued from April issue.)

DRS. GEORGE W. CRILE, U. V. PORTMANN, AND T. E. JONES, Cleveland, Ohio, presented a **Symposium on the Relative Rôle of Surgery, X-Rays and Radium in the Treatment of Carcinoma of the Uterus.** (For original articles see pages 528, 536, 541.)

DISCUSSION

DR. EDWARD A. WEISS, PITTSBURGH, PA.—Unfortunately, in the past we have heard surgeons declare that surgery should be the only treatment, and that radium has no place in the management of cancer, and then we have the positive statement of the radiologist who declares only in favor of the x-ray. We have very few surgical clinics where cancer cases have been considered as group studies. These perfectly honest and reliable statements of Dr. Crile and his associates make it clear that surgery has its decided limitations in the treatment of uterine cancer.

During my association with Dr. Werder we found many difficulties attending the radical operation, and for a long time that was the only method of treatment to which we resorted. Our results after several years showed decided shortcomings, and we felt that possibly radium would be of value, and we consequently combined radium with surgery but as Dr. Crile has said, we found the combination to be disappointing. We believe that in the last two or three years, where we have used radium alone, or radium with x-ray, our results are far better.

I would question the treatment of carcinoma of the fundus with radium and x-ray. I believe that surgery is still the method of procedure. In the treatment of these cases it makes a great difference what type of carcinoma we are dealing with, whether squamous-cell or adenocarcinoma. I firmly believe that regardless of what treatment we institute for adenocarcinoma of the canal, we have a very serious proposition and a condition that is practically impossible to cure.

I should like to emphasize the point that has been made that we should be fair and open-minded and we will be safe to follow the teaching of Dr. Crile, namely, we must recognize that surgery has decided limitations, that radium is a splendid adjunct, but from our present observations radium and x-ray promise the best results.

DR. EDWARD J. ILL, NEWARK, N. J.—This is a vital and intensely interesting subject. In 1884 I removed the uterus for carcinoma of the cervix for the first time, and just before the War, when we got the last journals from Europe, I saw that at Freiburg they were giving up operations for carcinoma of the cervix for the use of radium. I said to myself they are mistaken. But four years ago we

gave up the operation on the cervix for radium and since the ultimate results were so much better than from operation that from that time we have not operated on a single case of carcinoma of the cervix. My son, who is working in this line, tells me that 21 per cent of the cases where he has used radium have remained well over three years. In the past we have not operated on every case that presented itself, so we do not think it is fair to use radium on every case of carcinoma of the cervix, because of the hopelessness of the condition.

As to cancer of the body of the uterus, that is another question. I have not lost a single case of cancer of the body of the uterus from operation in twenty-five years, and there has not been a single recurrence in that length of time. Radium can do no better than that. On the other hand radium has been used in three cases that were not mine. In these three cases, the uterus was removed afterward, and in a great many sections not a single bit of tissue of a carcinomatous nature could be found. I think it is possible that as I grow older and do not like surgery as much as I used to, I may refuse to operate on cases of corpus carcinoma and have them radiated. At present I believe that corpus carcinoma should be operated on in preference to the use of radium.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I would not enter this discussion were it not for the fact that the remarks of Dr. Ill prompted me to do so. There is a certain percentage of cases in which I believe cancer of the body of the uterus should be operated on. Personally, not in twenty years have I had a single recurrence following operation for cancer of the body of the uterus. I have had many recurrences in cases of cancer of the cervix, and while I am not convinced that we still have the right treatment in radium and x-ray, I am willing for these men to try it out under Dr. Crile's supervision. That is the most desirable means of trying out radium and x-ray in association with a surgeon like Dr. Crile that has ever been presented to us, and I believe we will get some kind of answer we can rely on in cancer of the cervix. I have quite a number of cases that were operated on years and years ago that have yet remained well. I recall one case that I operated on more than twenty-five years ago, a woman, forty-five years of age, with far advanced carcinoma. I believed I had operated too late and that she would have a recurrence and die. I did a vaginal operation. The uterus pulled apart during the operation in three different pieces. Strange to say, that woman is alive today, and one or two other patients equally as bad are alive today also.

Within the last year and a half a woman came to me with cancer of the cervix and I said I would not operate, although the destruction of tissue was not larger than the rubber on a lead pencil. The case looked like an ideal one for radium. She was given radium and x-ray and was dead in four months.

DR. HERMAN E. HAYD, BUFFALO, N. Y.—Three years ago I sent a woman to the Cancer Hospital of Buffalo, who weighed 210 pounds. She had a large squamous-cell carcinoma of the cervix, as big as a small orange and certainly was an unfavorable subject for operation. She was bleeding profusely. Dr. Schreiner, who has charge of the cancer work in the Institute at Buffalo, gave her radium and deep x-ray applications. He showed that woman before the Buffalo Academy of Medicine a year afterward, with a number of similar cases. There was absolutely no return whatsoever of the disease. I naturally became enthusiastic over the treatment of cancer of the cervix by radium, and yet within the last year I sent Dr. Schreiner two more cases. Dr. Schreiner said to me, "These are the kind of cases in which we get splendid results." But both of them are dead. There is the disappointment. Although we may be enthusiastic over such treatment today, we have to study these cases carefully as we may be disappointed tomorrow. So far as cancers occurring in the corpus,

never returning, after operation, in the main it is true, yet I removed a cancer of the body of the uterus thirteen years ago, and I saw the patient a few days ago with a return of the disease in the stump. I had taken the cervix out, made a clean dissection. I sent her to Dr. Schreiner for radium treatment. Notwithstanding the poor outlook in these cases, whether we use surgery or radium, we must look at the subject with an open mind, and Dr. Crile is doing the right thing. When we have 300 cases in which surgery has been resorted to, and then 300 cases with radium, or radium and x-ray, our statistics will be worth something.

DR. GEORGE W. CRILE, CLEVELAND, OHIO.—In the interest of the discussion I should like to add that we have not given up the surgical treatment of carcinoma of the fundus, but are for the present using x-ray and radium in the treatment of cervical carcinoma.

DR. HENRY SCHMITZ, CHICAGO, ILL.—For the evaluation of radiation therapy in uterine carcinomata we should group them into these groups: localized, borderline, clearly inoperable and terminal. In the last mentioned group we have lost seven patients as a result of severe intoxication produced by the application of radium and x-ray. We have given up radiation treatment in the terminal or advanced cases entirely with radium and x-ray for the reason that these cases are absolutely hopeless from any standpoint of treatment. In our clinic we have not operated on any case of carcinoma of the cervix for the last three years; radium and x-ray have given us better results and the patients have survived three- or four-year periods free of all subjective symptoms. Surgery should not be combined with radium and x-ray in clearly inoperable cases as the patient will do much better and live longer without operation.

In our statistics of 303 cases published a year ago, we had 14 per cent absolute five-year cures, taking all carcinomata into consideration at that time.

The type of carcinoma is of great importance for radiation treatment. Cervical carcinoma are composed either of spindle-shaped cells or cylindrical cells or squamous epithelial cells. They possess a different radiation sensitivity. The basal cell carcinoma will respond to a 100 per cent E.S.D. radium and x-ray dose; the cylindrical cell adenocarcinoma to about 150 per cent E.S.D., and the squamous epithelial cell cancer to about 175 per cent E.S.D.

DR. HERBERT W. HEWITT, DETROIT, MICH.—It is quite generally known that some cases of carcinoma are refractory to the x-ray and to radium. I understood Dr. Crile to say that he did not employ surgery in any case of carcinoma of the cervix. I wonder what he would do with those cases of carcinoma of the cervix which are refractory. I would also like to ask Dr. Crile what his experience has been in removing the uterus with the Wertheim operation or a modification of it?

DR. CHARLES L. BONIFIELD, CINCINNATI, OHIO.—I believe that Dr. Portmann in his estimation of 9 per cent of permanent cures is about right. Dr. Hall said he recalls a number of cases that lived twenty-five years, so do I. But the thing I particularly want to speak about is that we must not forget the work of those men who have gone before. The truth of the matter is that in cancer of the cervix, Byrne, of Brooklyn, Baker, of Boston, and Reamy of Cincinnati, secured just as good results from high amputation of the cervix with cautery as any of us have obtained. That brings me to the second point. I was rather surprised at the rapid recurrence of these cases. I have seen cases die that I thought would live, and other cases I thought I had cured have died since. But remembering the work of our predecessors, it has been my custom

for a number of years in every case of cancer of the cervix to thoroughly destroy all cancerous tissue that I could with the actual cautery. In that way I believe I have reduced the mortality considerably and prolonged the lives of many.

DR. JAMES E. KING, BUFFALO, N. Y.—For four years I have not done a radical operation for cancer of the cervix and for the past two years I have had a certain amount of radium in my possession. All who do surgery for malignant disease must have been impressed with one thing and that is, that the extent of malignancy does not necessarily determine whether or not an operation is to result in cure. Some of the most marked and worst appearing malignant conditions clinically, have much to our surprise resulted in a cure; whereas other cases apparently with slight involvement have gone rapidly on to death after operation. I have found that the same thing is substantially true in the use of radium. There is unquestionably a factor concerning which we know little that controls the destiny of these cancer cases. We may call it resistance or immunity but there is some biologic factor which determines whether or not operation or radium or any other form of treatment will be of permanent value. This, in my opinion, is the important question in connection with the cure of cancer. The question of radium dosage is entirely a secondary matter and I am sure in the future it will be relegated as a more or less unimportant detail of radium treatment. At this point, I am prompted to ask the essayists whether or not they have ever seen the slight improvement from x-ray or radium where there has been a recurrence of cancer in the broad ligament. Personally I never have, and I have had opportunity to follow these cases which have had the most approved methods of radiation.

DR. PORTMANN (closing on his part).—With regard to carcinoma of the fundus of the uterus, we are not using deep x-ray treatment, but there is no reason why we cannot get good results in treating carcinoma of the fundus as well as carcinoma of the cervix. There is, of course, the difference in the cell resistance. A hundred per cent dose may kill in one instance, and a 70 per cent dose in another.

In answer to the remarks of Dr. King, we have been disappointed in radiation or surgery because we do not know the biological reactions of the cells and have no means of doing so at this time. The different types of cells yield so differently. A certain type of cell will yield differently under similar circumstances.

As to Dr. Schmitz's cases of carcinoma in which he reports five-year cures, we have had four cases of terminal carcinoma in which we expect no results at all.

DR. JONES (closing on his part).—With regard to deaths following radium treatment, I have had none because I have not treated type iv with attempt at cure. For their discharge and bleeding small doses of radium were given for palliation, but I can readily see that large doses of radium and x-ray would kill these type iv cases.

DR. CRILE (closing).—The mortality rate for my series of radical hysterectomies has been 7.4 of all that I have attempted to cure. The five-year survivals of all operations, palliative and radical, have been 16.3 per cent.

Regarding the technic, in cases of cancer of the cervix we always destroy all of the cancer that we can with the cautery the day before the hysterectomy if that is to be the only operation. We leave the alcohol pack in place over night and the next morning do an abdominal hysterectomy, carrying the dissection out into the broad ligaments. The reason for that is obvious. I did a group of Wertheim operations, but I do not do it any more because of the high mortality rate. In the cases in which I found carcinoma in the glands which I removed

also, the mortality was so high that I did not feel it was logical to continue that type of operation.

In cases of carcinoma of the fundus we have reversed the picture; we always operate on cases of carcinoma of the fundus through the vagina, first sterilizing the vagina for the purpose of killing any stray cancer cells which might be there. Also before operating we cauterize the cervix, pack it with alcohol gauze, and put on large clamps, thus firmly imbedding the gauze in the cervical canal. I never release these clamps until the uterus has been removed. Our great fear has been implantation of cancer cells. Our results have been so favorable as to convince us that we should continue in the same way.

Dr. King has certainly raised an important question. In our biophysics department we have under way a research which we hope will enable us to forecast the exact physical condition of the cancer in any place so that the proper dose can be prescribed.

DR. GEORGE C. MOSHER, Kansas City, Mo., presented a **Report of the Committee on Maternal Welfare**. (For original article see page 601.)

DISCUSSION

DR. G. W. KOSMAK, New York City.—I feel that this report should not be allowed to pass by without a word of commendation to Dr. Mosher for the excellent work he has done in connection with this committee. Although I am a member of the committee, it is entirely Dr. Mosher's work and we owe a great debt of gratitude to him for it.

I should like to draw the attention of the members to the beginning of this movement. Dr. Mosher has kindly given me credit for introducing it before the American Gynecological Society. It seemed to me several years ago things had come to such a pass that the organized medical profession of the country was being more or less slighted in this important work, and that lay interests had largely superseded our efforts in the direction of what should be considered purely a medical problem.

As I stated in my paper before our State society last spring, these lay organizations should take up certain parts of the problem and carry them out, but remember, gentlemen, this in most of its essential features is a medical problem, and it is only through the insistence of organizations national in their scope, such as this one, that the public at large will appreciate that fact and will give us the credit for much of the pioneer work and insist on our participation in it. For instance, funds appropriated by the state and federal governments should not be spent in the collection of useless statistics which have no bearing on the subject. I have lived through several activities of that kind in my own city, and I find that money has actually been wasted in the collection of information with little or no bearing on the subject, money that should have been expended for visiting nurses, for doctors, for hospitals, to care for these women. By insisting as physicians on the proper conduct of these investigations and the proper expenditure of these moneys, real scientific progress can be made. I do not want to decry the possible future good effects of the Sheppard-Towner bill. That bill as first drafted left the medical profession entirely out of consideration. There were so many changes made that the authors possibly did not recognize it at all when it came up for final passage. The bill was radically changed from the beginning to the end, and if it had gone through as first proposed the entire administration would have been in lay hands. Now, medical men have something to say.

The profession has been bombarded for the last ten or fifteen years by statements largely from lay sources, concerning the high morbidity and high mortality in pregnancy, due to the doctors in contrast with midwives. We should not put the midwife on a pedestal. There is probably some excuse for her, but there is no reason why we should continue to allow her to exist forever. In the course of the next fifty years we will find something that will displace her, but at present we have to put up with her. For the present she must be under the direction of medical men. In Pennsylvania Dr. Nicholson and his confreres are directing the midwives, with the result that they now have excellent statistics. Doctors have been blamed for the high death rate from sepsis. In New York City we have recently gone through an agitation of that kind. Let me call your attention to the fact that there is bound to be sepsis. It comes in waves. We get series of cases that resemble epidemics. Next year, without any great change in technique, these septic statistics disappear and there is no further cause for complaint, and when somebody simply says that doctors have more sepsis than midwives it is not necessarily true. You can make figures tell almost any story.

What shall we do in a practical way? There is no need of our Association blaming anybody for this state of affairs. Obstetric practice can, however, be improved, especially by the general practitioner who sees most of these women. He will not do it unless the economic factors are changed to pay him for so doing. The man in the country district, who has to travel miles to take an obstetric case for ten dollars, is not to blame if he cannot give proper attention to that case. It is up to us to propose something. Our committees on Maternal Welfare have been working for three years, and are now getting together material upon which to base recommendations that will in time, I hope, do some good. The Association can do something in a practical way; it can cooperate; it can show its readiness to associate its activities with any other organization that will agree to bring something forward of a practical character. It is a mistake to assume that the Sheppard-Towner bill will correct the situation. I do not believe it will. It will take more than that, and it will take community interest. The point I have tried to bring out repeatedly is that unless you develop community interest you will not get results. The fact that a state appropriates \$100,000 to match the Federal government's \$100,000, will not accomplish much. The final result must be accomplished by members of this and other Associations and by local obstetricians who will enter their respective communities and develop this sense for the necessity of better obstetrics. That will do more good than large appropriations of money which I am afraid will, as in the past, be devoted largely to the collection of statistics by nonmedical people and nurses who ought to be better occupied. Unless we exert our own influence, that state of affairs will continue. It is with a plea for greater community effort manifested through the members of national bodies such as this one that I want to close my remarks, and finally to commend again Dr. Mosher for the excellent work he has done in bringing this matter before your attention.

DR. JAMES E. DAVIS, DETROIT, MICH.—I want to commend the work of Dr. Mosher. This is a remarkable report. It represents a great deal of careful work, and any of you who have had the work of collecting statistics know how difficult this undertaking is.

I am hardly as sanguine as the last speaker. I do not feel quite comfortable when laymen come to me and tell me what I should do professionally, especially if I know the things they tell me to do are the things I ought to do. I think

I should have known these things before and have acted before they came with their suggestions.

I believe we are just about in the position stated by Dr. Kosmak, namely, we are not so much to blame as some of our critics have said we were, and yet there is something wrong, and I am quite sure that the statistics wherever these conditions exist can be greatly improved. I agree with the last speaker that a national body like this should deliver to the public information that should be considered authoritative, and we ought to be very careful in the collection of that material. I only wish we might have an endowment that will go beyond what we can give to this work from the funds of the Association. If we had an amount of money, say \$5,000, I think part of it might be given to the expenses of collecting data and of making a statistical study, and when done by a committee such as we have we know that the data collected would be reliable. There would not be any bias in the report; it would be a scientific collection of facts from the best available sources. I believe there ought to be some clinical and laboratory research work done, as that would support the statistical report gathered. An appropriation might be administered so that in two or three different places we might have this clinical and laboratory research work carried on. At the end of the year all data would be assembled and could be issued in pamphlet form. This would constitute an authoritative statement.

DR. LIDA STEWART COGILL, PHILADELPHIA, PA. (by invitation).—I only emphasize what Dr. Kosmak has said. It has been said repeatedly that the public must demand better obstetrics, and I have always rather resented that remark. I feel that physicians should be the leading factors and directors in this work of creating the demand among the public for better obstetrics. It is rather humiliating to have lay organizations come to us and ask that we give this prenatal care. I feel that each physician should go out and organize this work in his own community and be responsible for the fact that it is possible for every woman in that community to receive prenatal care. There is a great deal of medical prenatal care that must be done. If we are going to have the dignity and high standard of obstetrics maintained, it will never be done by waiting for the public to demand better obstetrics from the physician. It must be the reverse. We have the cart before the horse when we have the laity demanding better obstetrics from us. How are we to know how much prenatal care and postnatal care is being done in our community? In Philadelphia, in one of the health organizations with which I am connected, we found in making a survey that there had been no effort made in this city to find the type and amount of prenatal care being given. We tried to find this out by sending an annual questionnaire to each organization doing so-called prenatal care work, asking just how much prenatal care was given to patients and what were the results; how many were taking routine blood pressures, making routine Wassermann examinations, and securing vaginal secretions for microscopical examinations. It was surprising to find how little of this information we could receive from institutions. At first, there was a feeling of resentment at our asking these questions, but when they found out what we were trying to secure, we received a few more replies. It was clearly pointed out that institutions must be provided with more social workers and physicians to enable us to get these statistics. I feel very keenly physicians must be the leaders in this cause. We all know it is the medical prenatal care we must ourselves direct, and when we have public meetings in health centers it is difficult at times to find a physician willing to speak. It is all in the hands of lay workers and this is a reflection upon us.

DR. OTTO H. SCHWARZ and DR. ROBERT CROSSEN, St. Louis, Mo., read a paper entitled **Endometrial Tissue in the Ovary**. (For original article see page 505.)

DISCUSSION

DR. JAMES E. DAVIS, DETROIT, MICH.—This presentation should call to our minds the logic used by Dr. Deaver yesterday, that in medicine we can frequently criticize one another for our limitations, but if we are to be thoroughly prepared our subject is of enormous size. This presentation this morning brings to our attention the work of the clinician who has gone into the laboratory to enlarge his knowledge of a clinical subject. We need just this kind of work all the time to amplify the exact knowledge of the clinician. In this presentation there is the correlation of pictures. This promises help, to understand from further work just how we are to recognize the gross pathology of these conditions when the abdomen is opened. It may be asked, is it of any consequence? If there is a menstrual reaction in the appendix it must have clinical significance. If this is in the ovary, it must be of clinical significance.

The outstanding things in connection with this work from the standpoint of the gross pathology, are the changes so far as we are able to recognize them from the work of Dr. Schwarz, which appear upon the surface of the ovary, and usually the appearance is that of a cyst or hematoma, or also perhaps in general terms a displaced tissue, a graft as it were.

Coming to the microscopic conditions, we could very logically argue the question as to what is the explanation. Dr. Schwarz has already covered that in saying that there is a possibility we have to deal with the germinal cells of lower inclusion. We are all familiar with that type of change. We may consider, as he has mentioned, the germinal follicle which goes on to luteal formation. All these have to be considered and for practical purposes are not so important as the study of the gross pathology, so that we can make clinical applications of this work. If this occurs in 10 per cent of our cases, surely we have a new pathology to be written concerning the ovary.

There is a great field for clinical research, and when we talk about the laboratorian and the clinician being apart, it is perfectly absurd to think of them as being separate individuals. The laboratory worker ought to be constantly enlarging his knowledge of clinical things; the clinician should be constantly going into the laboratory and ought to be able to read within a limited degree the microscopic pathology of the specimens he has removed.

DR. FRANCIS REDER, St. Louis, Mo.—Some years ago I presented a paper before this Association on "Premenstrual Appendicitis," by that I mean, an attack of appendicitis preceding the menstrual period by two or three days. Many physicians have diagnosed this condition as an ovarian pain, which it is not. The slides thrown upon the screen clearly demonstrate to me the correctness of my diagnosis in these cases. The endometrial tissue demonstrated microscopically in the appendix explains to me the attacks of appendicitis shortly before menstruation. With removal of the appendix the attacks of pain cease.

DR. JAMES E. SADLER, Poughkeepsie, N. Y.—I want to emphasize what Dr. Davis has said. I presented to Dr. Sampson one of the four cases in which one of the locations of this lesion was in the appendix. It was due to our local pathologist (Dr. Carpenter), in association with the pathologist of the State Board of Health, that this pathologic condition was noted.

My case, not only had its original inception in the right ovary but the appendix microscopically showed a distinct lesion, and four inches from the ileocecal junction

there was a distinct obstruction, which showed the characteristic endometrial tissue described; therefore, the discussion made by Dr. Davis brings home to us emphatically the fact that there is no divorcing the clinician from the laboratory man, and that one is dependent upon the other.

DR. WM. S. BAINBRIDGE, N. Y. CITY.—The association clinically between a diseased right ovary and appendicitis and the likelihood of premenstrual appendicitis was pointed out by the late Dr. A. J. McCosh, who often called attention to the anatomic relationship of the blood vessel of the right ovary and the appendix.

DR. EDWARD J. ILL, NEWARK, N. J.—I want to ask, if this is endometrial tissue, why does not the cavity empty in the uterus?

DR. EDWARD A. WEISS, PITTSBURGH, PA.—This study of Dr. Schwarz makes me feel that we have been lax in our observation and study of this type of ovarian pathology. Studies like this bring out splendid clinical observation just as years ago, Cullen made a careful investigation of all fibromata in the Johns Hopkins clinic and found a surprisingly large number of adenomyomata that had been classified as fibromyoma.

The finding of endometrial tissue in the ovary in association with hematoma presents an interesting phase of clinical deductions and I gather that Dr. Schwarz does not consider hematoma as an endometrial reaction. May I ask the cause of the hematoma we so frequently find in young women? Is the bleeding a secondary affair?

DR. SCHWARZ.—The blood is associated with menstruation.

DR. WEISS.—The ovarian hematoma I have found to be of much clinical importance. Not infrequently they are of particular interest from a bacteriologic standpoint and have been found to be of particular virulence and should not be regarded as a simple hematoma or slight infection. I would like to ask Dr. Schwarz whether he has made observations on the bacteriologic findings of these ovarian hematomata.

DR. JAMES E. DAVIS, DETROIT, MICH.—I would like to ask Dr. Schwarz to speak of the analogy existing between this condition and aberentia of the mammary gland. The aberentia we find in the interstitial portion of the oviduct or horn of the uterus, the glands being carried out beyond the lumen. When you make a cross section of the horn of the uterus you will find gland formation.

DR. SCHWARZ (closing).—In the first place, I took up this study to confirm the microscopic findings of Sampson. Sampson in his very voluminous article which appeared in the *AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY* in 1922, reports his cases in great detail. He goes over many case histories and points out distinctly the relation between the clinical and the pathologic sides. Therefore, I refer you to his article.

As to the question of Dr. Ill, these hematomas are frequently closed cavities and blood does not escape except when there is perforation. I wish to call his attention to the fact that the endometrial glands are of the serous type and one would not expect mucus in these cavities. Only the cervical glands secrete mucus.

As regards the question of Dr. Weiss, we have made no bacteriologic study, but we feel there is no connection with infection. For instance, in the case where the appendix was riddled with endometrial tissue, there was no evidence of any inflammatory reaction.

As to the glands which Dr. Davis referred to in the uterine horn, so-called cornual adenomyoma of the uterus may be derived in two ways. They may be derived, in the first place, from the proliferation of the lumen of the interstitial portion of the

tube, and in the second place, they may occur after a transplant has taken place at this point with secondary invasion of the wall. Previously, when the cause of adenomyoma of the uterus was so much discussed, there was one type which had a direct connection with endometrium, and the other type closely related to the serosa. There was frequently no stroma in the subserous type. I believe Sampson has suggested that this type may result from the implantation of tubal epithelium around which there is no accompanying stroma.

DR. O. M. GRUHZIT, Detroit, Mich., read a paper entitled **Eclampsia—Is It a Biological Necessity?** (For original article see page 588.)

DISCUSSION

DR. WM. S. BAINBRIDGE, New York City.—The essayist has brought us the result of some very painstaking laboratory and clinical work which, if the findings are verified by others, may prove of practical value not only in preventing eclampsia but in opening a door for promising research in other conditions. The determining of the coagulability of blood and the initiation of proper preoperative treatment have saved many patients from serious complications and even death from hemorrhage.

Some of us who have been particularly interested in cancer have been hoping that the study of the blood may help us explain why 33½ per cent of all mice who live two years or over develop malignant disease, and about five per cent of those so afflicted spontaneously recover from the disease. Some light may come through laboratory study of the body fluids, especially the blood.

Certainly the paper we have heard today, while startling because of its statements and needing confirmation, is enough to encourage further research along this line.

DR. EDWARD SPEIDEL, Louisville, Ky.—I would like to ask some questions in regard to the incompatibility between the husband and wife. If the blood of the pregnant woman is incompatible with her husband, then at the end of pregnancy she bears an incompatible infant. It is supposed that during the pregnancy the excretions of the infant enter the mother's circulation, does that immunize her against the former incompatibility existing between herself and her husband in future pregnancies? In the second place, when and how shall we examine the blood of the infant and type it with the mother in case of eclampsia, to prove or disprove the assertion the essayist has made?

DR. GRUHZIT (closing).—Dr. Speidel asked whether there are changes in the mother's blood at the end of her pregnancy if she has an incompatible baby. This phase of the subject has not been studied to any considerable extent. Among the cases of eclampsia, only in two cases had the serum lost the agglutinating power. This may be explained by assuming that fetal cell elements passed into the mother's blood stream in sufficient amount to bind the mother's agglutinins.

DR. DAVID HADDEN, Oakland, Calif., presented papers entitled **Two Cases of Recurrent Cyst Adenoma of Ovary and Abdominal Hemorrhage from Ruptured Graafian Follicle Cyst.** (For original articles, see pages 598, 600.)

NEW YORK OBSTETRICAL SOCIETY

MEETING OF DECEMBER 11, 1923

THE PRESIDENT, DR. FRANKLIN A. DORMAN, IN THE CHAIR

DR. JOHN O. POLAK showed and described several specimens of **Ovarian Fibroma, Sarcoma and Carcinoma**, illustrative of the evening's topic of discussion, **Solid Ovarian Tumors and Their Treatment**.

DRS. S. H. GEIST AND ELIOT BISHOP each presented a paper on this topic. (For original articles see pages 567, 576.)

DISCUSSION

DR. LAWRENCE W. STRONG.—In reading the subject as assigned, "Solid Ovarian Tumors and Their Treatment," I was a little in doubt as to what classes of tumors would be presented and considered. Of course, in using the word solid tumor of the ovary we do not get a very clear picture of what the real nature of the tumor may be. The word "solid" does not imply very much and I should much prefer to use the classification that Dr. Geist has already alluded to, namely, the stromatogenous and parenchymatous divisions. By parenchymatous, one means the essential physiologic products found in the ovary, and by stromatogenous one means the supporting tissues, and I think histologically one is always able to make out that distinction. As it, nevertheless, is plain that Dr. Bishop and Dr. Geist wanted to make the subject broader than that and wanted to include epithelial tumors as well as stromatogenous tumors, I think I should have entitled their paper "The Less Usual Tumors of the Ovary," meaning by that both epithelial and stromatogenous types because, plainly, the common tumors of the ovary are the ordinary cystic tumors with which we are all very familiar, and in those we do not find such great difficulty in making a decision as to their malignancy or their benignancy. When it comes to the solid epithelial tumors of the ovary I think one might say invariably they are malignant. A truly solid epithelial tumor of the ovary must surely be malignant, but that does not absolutely mean that the patient will die of a recurrence if it is removed, for occasionally it may happen that we are able to get ahead of the process, and even though it is undoubtedly a malignant tumor, complete ovariectomy will be successful in conserving the patient's life.

Solid epithelial tumors of the ovary are, for the most part, of the brain-like, encephaloid type, and undoubtedly are of rather high grade of malignancy, as Dr. Geist has already said. As to the more dense ones, I will confess I have never seen a primary scirrhous carcinoma of the ovary. Metastatic lesions from the stomach or the breast we meet with in the form of the Krukenberg tumors. The malignancy of the growth in this case is dependent upon the primary tumor, which is the important factor. I will now pass to the stromatogenous tumors.

Dr. Bishop did quote me as saying from my slight experience at the Woman's Hospital, that the fibroma are the most frequently found, and I still believe that. In looking over today the number of solid stromatogenous tumors of the ovary that we have met in the last ten or twelve years, I find we have had one true sarcoma and three true myomas. I did not total the number of fibromas we

have had in those years, but I am sure it must be over a hundred, and I have met with four in the last two and a half months. I feel that surely the fibroma is the only one that is commonly met with, and that one should seriously consider as the solid stromatogenous tumor of the ovary. There are varieties of that tumor. There is one which replaces the entire ovary, which is not so common, and there are also the forms which one gets on the surface of the ovary, the papillary forms. Those are commoner, and they have a particular interest because they are exactly analogous to the normal stroma of the ovary; in fact, there is no boundary line. The tumor at the periphery simply shades off into normal ovarian tissue which gives the hint as to their relative benignancy. One surely could not feel that a tumor of that sort would ever result in the destruction of the life of the individual.

The myomata, as far as my slight experience goes to show, must be rare because muscle tissue in the ovary is rare. It comes in largely from the muscular tissue of the ligament situated at the hilus. If there is a myoma, even in the ovary, it is probably due to muscular tissue derived from the ligament musculature, the blood vessels and from the hilus.

As to the sarcomata, it is true enough, as Dr. Bishop has said, that one is not able to distinguish anything definite about a sarcoma cell which will always identify it from a very cellular fibroma. Perhaps the number of mitoses is the most conspicuous factor, but if one is going to make a diagnosis of sarcoma of the ovary, four things should be looked for: First, the normal stroma of the ovary should be demonstrated; second, the sarcoma cells; third, the intercellular substance which the sarcoma cell invariably lays down, and finally the blood vessels. So if one can distinguish those four it is fair to make a diagnosis of sarcoma of the ovary; but even then one is not dealing with a tumor which is of a malignancy to be compared with the epithelial growths. They are in a class by themselves, and I think that simple removal of the ovary, even if it is reported a sarcoma or fibrosarcoma, will result in the saving of the life of the patient.

There are some types of sarcoma, the very cellular ones of a very embryonal type, which may be more destructive than that, but, in general, they are not to be compared to the epithelial in the grade of malignancy.

As to the other forms of solid ovarian tumors I might say that they have a more academic interest than a practical one. Such forms I mean as the endothelioma. I see no reason why there might not be endothelioma of the ovary, although I have never seen one. I have seen endothelioma and angioma of the fallopian tube, strangely enough, for there have been only six cases of that type of tumor reported, but whether or not there has been actually demonstrated endothelioma of the ovary I am not prepared to say. If a tumor shows lymphangiomatous and hemangiomatous structures undoubtedly connected with the lymph and blood vessels and the cells lining those vessels, I think you can call them endothelioma of the ovary, but the forms of tumors of the ovary which sometimes have been termed endothelioma are epithelial and are simply termed endothelioma because they have a peculiar arrangement of the cells, perhaps in garlands, or perhaps in some type like the one Dr. Geist referred to, the folliculoma and the tendency has been perhaps to call those endothelioma. I think those have generally turned out to be epithelial tumors and the true endothelioma, if present, must be associated with the blood vessels or lymphatics, as I have said before.

The teratoma, the solid teratoma, or teratoblastomata, are surely very rare tumors, and they are undoubtedly very malignant because they are embryonal.

DR. ROBERT L. DICKINSON.—I desire to refer to the lack of sufficient clinical help to guide us in the practical handling of these cases, when the

abdomen is opened and a rare condition is found. It is all right with a patient at forty or forty-five, when most of these tumors occur, for at that age you can clear out the pelvis if you are in doubt, but in the case of the young girl to whom Dr. Bishop referred in opening his paper, one is in grave doubt at times whether to do a radical operation or not. It is to be deplored, that we have not had from the pathologists instruction to us clinicians who began too early to be pathologists, in order to know when you get solid tumor in your hand what to do with it by macroscopic and swift pathologic examination. If you take it out, and nothing else, when in doubt, you may have done extensive cancer cell implantation in clamping or taking it away and making raw surfaces.

I would like to say that in the case of the girl to which Dr. Bishop referred the tumor looked like a fibroid. It extended to the navel and filled the pelvis and the question there was, should we condemn that young girl to the menopause and childlessness? To some of the onlookers it did suggest a fibroid. It was, as you see, an unusual growth and history. The other ovary was affected. I cleared out her pelvis to the pelvic walls, leaving only a shell of cervix. She has gone fourteen months without recurrence.

DR. LEROY BROWN.—I think we have to deal with these cases clinically as they are presented to us. Where you open the abdomen and find a solid tumor of the ovary without adhesions, if the other ovary apparently is normal, the temptation is to remove that ovary alone without doing a complete ablation on the basis of the possibility of a fibroid. The pathologists tell us that if it is malignant we should remove the entire pelvic contents. On the other hand, I think many of us have had cases where recurrences have not taken place. I have one instance, of a patient on whom I operated twelve years ago for a solid tumor of the ovary without any adhesions. The impression produced was that it was a fibroid solid tumor. The report came back carcinoma of the ovary. I was much disturbed, but the patient was in her bed and, in fact, nothing more could be done. I heard from her one year ago and found her absolutely well.

Where there are extensive adhesions with free fluid and the other ovary is involved, or appears to be involved, unquestionably I think we should do a total ablation and make no attempt at conservation.

DR. HERMANN GRAD.—In one month I have had two cases of malignant ovarian tumors. One was very solid, and the other partly solid and partly cystic, so that it seems to me that they occur quite frequently, and, as Dr. Dickinson has pointed out, the great point with the clinician is what to do with the young woman. I had a case just a year ago this month at the hospital in a woman twenty years of age with an enormous ascites and a malignant ovarian tumor which was so friable that we had to remove it in pieces. I looked at the other ovary and it appeared absolutely normal to me except in one place and that place might have been a corpus luteum cyst. Nevertheless, I was so impressed with what the pathologists tell us that I excised this portion of the ovary that looked to be somewhat affected and left a tiny piece of ovarian tissue on the uteroovarian ligament. That woman had a very stormy recovery. She got an empyema and was in the hospital five months, but she is perfectly well now and is menstruating normally for the past seven months.

In many of these cases the question comes up of clearing out the pelvis, but the patients are not in condition to withstand such an extensive operation. I have a case in the hospital now with an enormous malignancy. That patient could not stand a radical operation. I was glad to be able to remove the tumor that she had and close the abdomen.

DR. W. P. HEALY.—Some years ago at Fordham Hospital I operated on a woman about thirty-five years of age, who had an annular carcinoma of the small gut, about four inches from the duodenojejunal angle. I made a very careful palpation of both ovaries at the time of the resection of the bowel and was quite satisfied that there was no evidence of involvement of either ovary. The woman made a very satisfactory recovery from the operation, but about a year later when Dr. Broun had this patient under his supervision in the Woman's Hospital, the lower abdomen and pelvis were filled with a fairly solid neoplastic mass and he was considering doing an exploratory celiotomy. He found that the lesion was now inoperable—carcinoma of both ovaries. In other words, what I want to bring out is this point: it is an exceedingly difficult thing to tell by palpation, and sometimes probably by inspection, whether an ovary has already had carcinoma engrafted in a follicle from peritoneal invasion, either from a neoplasm of the opposite ovary or elsewhere. This experience inclines me to endorse Dr. Bishop's point of view that, if cancer or something that appears to be cancer is present in one ovary, the treatment of the case should include the removal of the opposite ovary and uterus.

The second point I want to speak about is the question of irradiation of these solid ovarian tumors. A few months ago we had referred to us at the Memorial Hospital a young girl, sixteen years of age, who had an exploratory celiotomy in another hospital, done by a good surgeon, who had removed a solid tumor of the right ovary which was reported by his pathologist to be a sarcoma. This tumor recurred very promptly. Then she was referred to us. She had a large tense cystic smooth tumor filling the lower abdomen, extending up to the umbilicus, but chiefly right-sided. The abdomen was bulging and distended on that side. She looked quite ill and was having a good deal of pain. We subjected that tumor and the lower abdomen and pelvis to high voltage x-ray treatment. She was given a fifty-minute exposure twice. The tumor increased very rapidly in size after the treatment, likewise the pain. I was of the opinion when I first saw her, that the tumor could probably be removed surgically again and suggested that before attempting this, irradiation be carried out, with the idea of trying first to "knock out" the tumor cells by irradiation. I operated a few weeks later and removed the entire tumor mass, which was definitely encapsulated, but, nevertheless, universally adherent to the parietal peritoneum back of the broad ligament on the right side, and the bowel adherent all about. The left ovary was apparently normal in the gross. We felt we had possibly done something that was going to be worth while for that little girl. She made a nice convalescence and went home from the hospital fairly soon, but came back promptly in a few weeks with apparently the same tumor, that is, in size, the lower abdomen again filling up very rapidly with a solid mass. The pathologist's report was an embryonal cell type of tumor, very highly malignant, the histogenesis obscure. The tumor was a mushy, yellowish-gray mass except for its capsule. There still were viable tumor cells in the structures which had become adherent to it, and they are so highly malignant that if recurrence occurs even irradiation does not seem to touch it.

DR. S. H. GEIST.—Referring to the case reported by Dr. Gordon, I think that when one is dealing with a bilateral ovarian tumor, irrespective of what his opinion may be, one should remove uterus, tubes and ovaries. In view of the fact that bilateral ovarian tumors in more than 50 per cent of the cases are secondary to malignant neoplasms in other organs of the abdominal cavity, it is well worth while taking the time, irrespective of personal opinions to make a thorough exploration to determine whether it is primary or a metastasis. Bilateral tumors practically always mean malignancy; only about 15 per cent of them are benign.

There was one very important point that Dr. Dickinson brought up. He said "some of us were too old to take up the study of pathology." I do not think that is so. I think every man doing pelvic surgery, after he has removed a tumor and gets a report, whether it be malignant or benign, should take the trouble to go to the laboratory and see that tumor and study it under the direct supervision of the pathologist so that the next time he meets with such a tumor he will have some indication as to what to do.

There is no question but that malignant tumors of the ovary can be diagnosed grossly at the time of operation. Certainly solid epithelial tumors and the malignant stromatogenous unripe, round-celled sarcoma forms can also be diagnosed at the time of operation, and in that statement I think Dr. Strong will agree with me. If you are in doubt, it should be treated as though it were malignant. That makes the indication for operation very definite in that type of tumor.

In cases where there are bilateral tumors of epithelial origin, a complete operation is indicated. In a question of doubt as to their malignant nature in epithelial tumors it is wiser to do a complete operation. In bilateral tumors of the stromatogenous variety in a question of doubt a conservative operation may be attempted as borderline stromatogenous tumors give a good prognosis with a conservative operation. I prefer complete operation in all bilateral solid tumors.

After the patient is operated upon conservatively and a report of a malignant tumor is returned, one may with perfect safety reoperate the patient and do a complete removal, because, as shown by some very interesting experiments on rat carcinoma carried on by Dr. Francis C. Wood, local excisions or partial removals do not increase the danger from metastases or recurrences if a complete secondary operation is performed within ten to fourteen days.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF NOVEMBER 1, 1923

DR. WILLIAM E. PARKE IN THE CHAIR

DR. JOHN G. CLARK AND DR. FRANK B. BLOCK presented a paper entitled **Relative Values of Irradiation and Radical Hysterectomy for Cancer of the Cervix.** (For original article see page 543.)

DR. CHARLES C. NORRIS AND DR. M. E. VOGT (by invitation) contributed a paper entitled **Carcinoma of the Fundus of the Uterus, with a Review of 115 Cases.** (For original article see page 550.)

DISCUSSION

DR. W. R. NICHOLSON.—There should be no question, it seems to me, that all competent gynecologists will agree that radical operation for carcinoma of the cervix is a thing of the past. I am happy to say that for the past four years I have not done a so-called radical operation for cervical carcinoma. Some years ago I did use the Percy cautery, but after half a dozen cases, was convinced of the futility of the procedure. Since that time I have used the same instrument as a preliminary step to the use of radium, but I have come to the conclusion that aside from the removal of the sloughing mass, for the introduction of radium, there is no indication even here for operative procedure.

I personally believe that when one can diagnose carcinoma of the cervix, by either inspection or palpation, the case is beyond operation. I do not believe that the presence or absence of demonstrable areas of extension should enter into the question of operability. I believe that the Wertheim operation, done according to the published technic of its author, has failed to increase the span of life of those suffering from carcinoma of the cervix. By this I mean that the primary mortality and immediate secondary mortality is so high that the number of days of life lost by the women who have been operated upon, are greatly in excess of the number of days of life gained by the so-called successful cases. In other words, I feel perfectly hopeless regarding the operative treatment for carcinoma of the cervix, and believe that at present we can only hope that radium and deep x-ray treatment will offer some chance for these patients.

With regard to carcinoma of the fundus, I, of course, have a very different feeling. If I had to elect a site for carcinoma in a woman, I would most certainly choose the fundal portion of the uterine cavity. My experience has been that if the patient is seen within a few months of her first symptoms she has a very good chance of complete cure by an ordinary panhysterectomy. Of course the use of deep x-ray has to be considered in certain of these cases; as for instance a woman upon whom I operated three years ago, and in whom the extension of the disease was more widespread than I had expected. In this case I am certain that a small portion of the cervix was of necessity left *in situ*. The repeated use of x-ray and radium, by Dr. Pfahler, has resulted in the complete disappearance of anything which can be considered pathologic as far as the vaginal examination is able to reveal.

On the other hand, I have within the last few days advised against, or rather, acquiesced in the decision of a patient against hysterectomy, because the carcinomatous condition of the fundus was of three years' standing, and because the feel of the uterus impressed me with the belief that there was beginning peritoneal extension. She will have x-ray and radium.

I wish that Dr. Norris had been a little more definite in stating how he differentiates cases suitable for panhysterectomy, and I hope that when he publishes his paper, this point will be fully covered. There is one thing in his paper which to my mind, from the standpoint of cure, is more important than anything else and that is the question of bleeding at the time of the menopause. If it could be impressed upon all women that at the time of the menopause, any increase of bleeding is a danger sign, and that its occurrence means that a most thorough examination should be made by a competent gynecologist, with a uterine curettage if necessary, there is no question that we would see a tremendous improvement in the higher grades of the common schools, and by a nation-wide propaganda, upon all women, irrespective of age, there is no question that the statistics of cervical carcinoma could be improved beyond anything for which we can hope at the present time.

It has always seemed to me to be extremely unfortunate that women are not instructed as to what constitutes menstruation, in order that they might know that a mere discharge of blood from the genitalia is not necessarily a menstrual period. Unfortunately, otherwise intelligent women have absolutely no conception of what menstruation really is, and as is well known, there is a firmly entrenched belief that the menopause is usually ushered in by hemorrhages. Of course the difficulty is that in a good many instances benign hemorrhage does occur as a symptom. I believe that if it would be possible, by the teaching of physiology

in the higher grades of the common schools, and by a nation-wide propaganda, to enforce this one fact upon the women of America, we would see a tremendous improvement in the cancer mortality in the next twenty-five years.

Finally, I would simply mention the only adverse criticism of these two papers, which is the advice to use the sound in the office as a diagnostic means of detecting the possible presence of fundal carcinoma. It is all very well to have trained men, under the stringent precautions outlined by Dr. Norris, use this procedure, but I think it a grave mistake to advocate its use by the profession at large, as the ordinary nonoperating practitioner has absolutely no knowledge of what constitutes asepsis.

DR. HOWARD A. KELLY, of Baltimore (by invitation), spoke on Cauterization of the Uterine Cervix.

I am happy to return to my ancestral society after an absence of about thirty-five years. I made one visit to the College when this radium question was just being opened up and I was, I felt, somewhat discredited at that time judging by the reports in various papers, but after all, all my claims for radium have in time been fully substantiated, for radium is used in the clinic of every large hospital.

The cervix uteri is the source of all the stringy, glutinous, sticky leucorrheas, which are a source of distress and sometimes of obvious ill health to so many woman. While, as regards treatment, these lesions of the cervix are regarded as minor gynecology, I believe that they are often gonorrheal in nature and, if super-added to a lacerated cervix, are a common precursor of cancer of the cervix. If these etiologic data are correct, then this simple annoying ailment at once assumes major importance.

I desire to speak particularly of their cure. Under local topical applications, douches, paintings and packs, such as our immediate predecessors used, they never got well but haunted the consulting room of the gynecologist from year to year. The one method of treatment is that urged by Guy L. Hunner, namely, the use of the actual cautery. It is my custom to do nothing else but insist on a prompt treatment and thorough cauterization of the whole exposed diseased surface of the swollen cervix, with its cysts and its everted mucosa pouring its secretions out from such glands as are not obstructed and cystic. This can often be done without pain and without anesthesia. If the operator prefers, it can be done with from three to six linear cauterizing cuts well down into the disease, to be repeated in from four to six weeks at two or three intervals. I do not hesitate to make a deep, thorough cauterization. The effect of this is to shrink the cervix, cause the mucosa to draw back into place and to stop the tenacious, ropy discharge.

I never do this as a step in a plastic operation restoring the vaginal outlet, as the suppuration follows so quickly, the wound below would be in great danger of infection.

With this procedure available, I but rarely operate any more for laceration of the cervix, for unless such a laceration is very deep, it needs no attention in the absence of any infection of the glands and when the infection is there, the cauterization takes care of it perfectly.

This is a little-big matter, too apt to be neglected in these days when we so constantly prefer to discuss the problems of major abdominal surgery.

DISCUSSION

DR. STEPHEN E. TRACY.—I would like to ask Dr. Kelly if he ever uses radium in bad cases of leucorrhea.

DR. DANIEL LONGAKER.—There is nothing that I have learned in my entire career that has given as much satisfaction as the plan of treatment of these cases Dr. Kelly has outlined. I have, however, not used the large cautery knife, but the smaller cautery point. One can do this with the greatest satisfaction in the great majority of cases in the office. Commencing at the internal os, outward in a linear direction one cauterizes down to healthy tissue.

DR. CHARLES C. NORRIS.—I would like to ask Dr. Kelly if he draws any distinction between the cases of leucorrhea which are plainly of gonococcal origin and those the result of laceration. The pathologic lesion in these two conditions is quite different. The important thing is to recognize that in both these types, the organ of the discharge is the cervix, and that intrauterine medication or curettage is meddlesome and harmful. In the variety due to laceration, much depends upon the degree of the tear; many of these respond well to office treatment, whereas the more severe grades require a repair. In the milder grades of laceration, the cautery produces excellent results. I believe, however, that neither canterization nor radium is entirely free of danger in the gonococcal class. In any event, the integrity of the internal os should be carefully maintained.

DR. JOHN M. FISHER.—The way I usually treat these cases of neisserian infection in nulliparous women and which I find highly satisfactory, is as follows: Place the patient under the influence of an anesthetic, preferably gas, then give the vagina and vulvar structures a thorough mechanical scrubbing with soap and water, fix the cervix with a tenaculum forceps, dilate the cervical canal to the internal os with bougies, cleanse with absorbent cotton, then remove the tenaculum forceps, introduce a Ferguson's cylindrical speculum, pour in a solution of nitrate of silver, (35 grains to the ounce) allowing the cervix to be bathed in this solution for a period of two to four minutes. A forceps armed with a large wad of cotton or gauze is then introduced into the vagina, and the speculum drawn over the forceps so as to make thorough application of the silver solution to the whole mucous membrane of the vagina. The silver solution is also applied to all of the vulvar structures and to the urethra. Normal salt solution is then poured into the vagina to neutralize the excess of silver and this is followed with a tampon of lamb's wool, as much as the vagina will hold, covered with lanoline 75 per cent, ichthyol 25 per cent. Upon the withdrawal of this twenty-four hours later, the vaginal mucosa usually presents a pale pink hue. In very many cases I have found the discharge arrested, extending over a considerable period and in some cases it never returns. I consider this one of the best forms of treatment in cases of chronic neisserian infection of the cervical canal and vagina. When necessary it may be followed by other forms of treatment.

DR. HOWARD A. KELLY (closing).—I have seen patients with leucorrhea cured by radium but I have become so wedded to the simple methods outlined tonight that I have stuck to them. For twenty years I have used nitrate of silver from 5 per cent up to 20 per cent, especially for vaginitis, but not for cervical disease. It does often literally wipe out the disease of the lower tract. The trouble in the cervix is so much deeper that I do not believe it can be reached by this means. In using the large red hot platinum point I am not afraid of over-citrization. I have never seen it and normal labor in cases of subsequent preg-

nancy proves its safety. I would not like to cauterize extensively up in the cervical canal; fortunately the everted and exposed surfaces on that are the parts mainly effected and needing treatment. This method is also one of our important ways of curing sterility by purging the uterine inlet of the infected plugs of mucopurulent material. I am obliged to Dr. Noble for the clear way in which he states the more deliberate methods of our predecessors, but our predecessors did not have to deal with people who came in the morning after traveling two or three hundred miles by train and who were at once in a hurry to go back the same night. I have a group whom I call my telephone booth patients, those who call me up with, "I want my treatment in order to catch the next train." I ask them, "Why didn't you tell me? I would then have met you in the railroad telephone booth and have inserted the radium and you could have caught the very next train." Some interpret the facetiousness seriously. It is just a little vexations to have such an important thing as life and health handled so casually. Dr. Norris, I fail in the differentiation of ueisserian from other causes of this infection. I have classed them all into as probably neisserian and treated all alike. I do not believe any other than the treatment outlined will cure this disease,—all honor to Hunner's perspicacity. I rarely operate any more for laceration of the cervix.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

ESSENTIALS IN ROENTGENTHERAPY OF INTEREST TO CLINICIANS; WITH A CONSIDERATION OF ITS APPLICATION IN GYNECOLOGY

By M. R. ROBINSON, M.D., F.A.C.S., NEW YORK

Adjunct Gynecologist to Beth Israel Hospital, Attending Gynecologist to Beth Mosess Hospital

(Continued from April issue)

III. ROENTGENTHERAPY IN GYNECOLOGY

The main gynecic affections in which roentgen rays are employed with varied degrees of success are: (A) ovarian dysfunction; (B) uterine myomata; (C) sarcoma uteri; and (D) carcinoma uteri.

A. Dysmenorrhea and metrorrhagia of the oophorogenic type, can be stopped with an x-ray dose sufficient to destroy the function of the graafian follicles. Before resorting to this plan of treatment, it is our duty to inform the patient that with the cessation of her excessive or irregular uterine bleeding, her function of ovulation will also be sacrificed. Although some authorities claim to be able to so regulate their dosage as to entail only a temporary loss of menstruation and fecundity it is, nevertheless, advisable not to submit young individuals, or those desiring to preserve their procreative potentialities, to this form of treatment, unless coexisting diseases, such as advanced cardiac, renal, or pulmonary affections make the adoption of this procedure imperative. Early gestation also forms a definite contraindication to the irradiation of the genitalia as it may exercise a deleterious effect upon embryonic development. It happens at times that the uterine bleeding, particularly the premenstrual menorrhagia, will be more excessive, immediately following the course of x-ray treatment for one or more periods, and the patient will naturally be greatly discouraged and doubt the value of our therapeutic agent. This just criticism may be obviated if the irradiation is administered at the most propitious time in the menstrual cycle. It is now a well established physiologic fact, that the follicle and the corpus luteum are the two antagonistic forces which respectively stimulate and inhibit uterine bleeding. The graafian follicle dominates during the first half of the estrum and under its hormonal influences the uterus is preparing itself for the next pregnancy or men-

struation. The moment the ovum fails to become fecundated and dies, menstruation sets in, and immediately the corpus luteum gains in ascendancy, and as soon as it reaches its full development the bleeding ceases. Hence it is clear that if the treatment is given during the first two weeks of the menstrual period, the follicular activity will be suspended and the next uterine flow will be suppressed. On the other hand, if the irradiation is undertaken when the corpus luteum occupies the functional stage, not only will the next ripening follicle not be effected, but the existing inhibitory influences will also be curtailed, and the next uterine bleeding will be hastened and increased. But even in cases in which the proper time for the irradiation has not been chosen, a delayed success will follow, and only in rare cases may a second course of treatment become necessary. We may, therefore, state with definiteness and positiveness that functional uterine bleeding is curable with deep roentgen-therapy and should no longer be subjected to surgical procedures. Besides the avoidance of the primary mortality of one to three per cent, which hysterectomy entails in the most skillful hands, this form of treatment is also free from morbidity, and the psychic effects which follow this form of artificially induced menopause are far milder than those resulting from total hysterectomy. This last advantage is gained from having left the ovaries *in situ* in which the interstitial glands, the most refractive tissue in the ovarian parenchyma to x-ray, remains undisturbed, thus minimizing the ensuing vasomotor disturbances and preserving the *libido sexualis* for a much longer time.

B. The myomata which cause profuse regular and irregular uterine bleeding are the interstitial and the submucous types. The bleeding resulting from the former class can be controlled and the tumors themselves can be reduced in size, and at times also made to disappear, through the irradiation of the ovaries. This form of bleeding may, therefore, be considered as oophorogenic in contradistinction to the submucous variety, which is uterogenic in character and upon which ovarian castration has not only no effect but aggravates the bleeding. The reason proffered for this condition is that with the shrinkage of the uterus pursuant to ovarian radiation a constantly increasing hindrance to the return circulation in the tumor develops and the bleeding grows worse. This theory has been clinically substantiated and such fibroids, under the persistent and continuous diminution of the uterine volume, have in time become extruded so that they appeared at the external os. Only through their surgical removal did the bleeding finally stop. Our greatest therapeutic successes with fibroids are accomplished with the interstitial type, when the tumors do not exceed the size of a three or four months' gravid uterus. As soon, however, as the tumor reaches greater dimensions the anatomic position of the ovaries becomes distorted, and the direction of the x-rays becomes a matter of hit or miss. Many of these tumors, due to their size, also give rise to pressure symptoms and must hence be classified among those amenable to surgical treatment. The subserous pedunculated fibroids rarely cause bleeding and call for no treatment, excepting when they give rise to subjective symptoms on account of their excessive size or when twisting of the pedicle occurs, then they too become surgical cases.

In undertaking, therefore, the treatment of uterine fibroids by

means of x-ray, a correct diagnosis is essential. We must first establish the size and kind of fibroid; we must exclude the very large tumors which cause pressure disturbances; we must ascertain that there are no intrauterine fibroids; that the tumors are not in a state of necrosis and degeneration; that there are no concomitant inflammatory processes in the uterine adnexa; and last but not least, to exclude the possibility of a malignant condition. In view of these pertinent facts, it is absurd to permit ourselves to be misguided by the promiscuous statements of some ill informed x-ray therapists, that in the leading European clinics the surgical treatment of fibroids is a thing of the past. What we may state with authority and truth is, that the number of hysterectomies for fibroids in the German clinics in particular, has been greatly reduced when compared to ours. This is due to the fact that the moderate sized tumors of the interstitial type, which constitute the largest percentage of benign uterine neoplasia, are all, with very few exceptions, treated with success by deep roentgentherapy. We may hope that with an increasing knowledge of the efficacy of roentgentherapy in this country, and with a growing consciousness that our patients are entitled to a form of treatment which renders no mortality and no morbidity, that the number of hysterectomies for interstitial fibroids performed here will also reach a very low level.

C. Sarcoma of the uterus affects the body much more frequently than the cervix or the portio vaginalis. Its seat of greatest predilection is the uterine wall, the center of myomatous or fibromyomatous tumors, and lastly the mucous membrane. A diagnostic curettage will, therefore, be of value in but a limited number of cases, for to obtain a section from the uterine wall, or of the tumor, would entail an attempt equal in magnitude and seriousness to a hysterectomy. This has caused Seitz and Wintz to adopt clinical diagnostic guides, such as the rapid growth of the tumor, and its correspondingly rapid diminution in the size after irradiation, as positive signs of uterine sarcoma. An x-ray dose equivalent to 75 per cent of the skin erythema dose will suffice to destroy sarcomatous tissue and stop its further growth. Due to the fact that sarcoma metastasizes very slowly, radiotherapy renders far more gratifying results in this affection than it does in carcinoma.

D. Carcinoma Uteri.—The appalling toll in diseases and death which womankind in particular is paying annually to the Moloch cancer demands that we render an unbiased accounting of the present therapeutic status. A brief historical review of the treatment of uterine cancer, for the past fifty years, will greatly elucidate why our methods of procedure have undergone such wide oscillations from time to time and why the therapeutic pendulum is still vibrating.

Accepting the teaching of Virchow that cancer is primarily a local disease, surgeons have directed their efforts to limited resections of the cancerously affected organ or tissue. Subsequent clinical results have proved this procedure to be inadequate, and further pathologic studies have shown that the earliest clinically recognizable cancer is no longer a strictly local affection, but one in whose mediate and immediate vicinity cancer nests are already present.

Wider excisions, therefore, became the surgical slogan, and the era of the radical abdominal operation was ushered in on January

30, 1878, by Wilhelm Alexander Freund, who performed the first extensive abdominal hysterectomy for cancer of the uterus. The primary mortality from shock, sepsis and injury to the ureters, which accompanied this operation, was so frightful, that within less than seven months after Freund's operation saw the light of day, it was abandoned by most surgeons.

On August 12, 1878, Czerny extirpated a cancerous uterus *per vaginam*, and his method soon found favor with the profession on account of its greatly diminished primary mortality. Czerny's original operation soon underwent many modifications. Schuehard's procedure has greatly facilitated a wider approach to the pelvic connective tissue, but none of these operative innovations sufficed to reduce the high percentage of recurrences, or to lengthen the period of curability. In spite of these lamentable shortcomings the vaginal method held sway for nearly twenty years.

In 1897 Wertheim revived and revised the teachings of Freund to which he had added definite and epoch-making contributions, such as the isolation of the ureters, the removal of the pelvic lymph glands and the wider excision of the parametrium. Without intent to detract from Wertheim's meritorious service, it may be noted, that Ries and Clark in our own country, and Rumpf in Germany have anticipated him and carried out an almost similar operative technique in 1895. As time advanced and Wertheim's method gained in efficiency in his own hands, as well as in the hands of others, particularly in those of Franz, the radical abdominal route was universally adopted. The primary mortality was reduced to as low as 10 per cent, and the percentage of cures raised to 20 per cent.

Just about 1911 when the Wertheim operation had reached the zenith of its accomplishments, deep x-ray therapy was introduced. The freedom from primary mortality and the magic-like rapidity with which the cervical carcinomata would melt and disappear under the influence of roentgen rays caused the schools in Erlangen, Freiburg, Frankfurt and Berlin to acclaim deep x-ray therapy as the ideal method of treatment, to the exclusion of surgery.

Over a decade has now passed since surgery and deep radiotherapy vied with each other for supremacy in the treatment of uterine cancer, without a decisive victory for either procedure. Statistics emanating from equally reliable sources furnish equally gratifying results; and from a personal visit of some of these schools I am convinced that the personal equation of the head of each clinic greatly influences the method of procedure adopted. I am also convinced that in the very near future no sharp lines will be drawn between the operating and irradiating methods, and that patients will be treated not according to the method adopted by a given school, but according to the clinical indications in each individual case. Bumm, who has been an ardent and enthusiastic advocate of radiotherapy, has recently resumed surgical activities, for he claims that the durability of cures has been shortened through generalization, and that surgery in the properly selected cases does ultimately render the best results.

In the midst of these clinical vacillations from conservative to radical surgery, then from radical surgery to deep x-ray therapy, and now back again to surgery, where do we stand on the problem of uterine cancer? What method or methods are we to recommend to

our patients? Can we conscientiously exclude either method, and if not, how and when should they be employed?

In all operable cases surgery must take the first place; for by removing the cancer-bearing organ with as much of its surrounding tissue as is consistent with safety, we lessen the force and the number of the invading foe, and thus indirectly add to the potency of the organism's natural immunity and resistance. Furthermore, the trauma produced by the operative attack calls forth a local inflammatory reaction with a mobilization of leucocytes and lymphocytes, which, according to Teilhaber,⁷ establish a local immunity of one to two years' duration. The operative procedure also calls forth a constitutional reaction which stimulates the hematomphocytic centers to increased activity and thus raises the general resistance. If in addition to the operative advantages we also add x-ray therapy in doses which will still further weaken the cancer cells left behind, and at the same time stimulate the healthy tissue to a higher degree of cellular immunity, we have accomplished all that modern scientific medicine is capable of.

Inoperable uterine cancer should be submitted to x-ray therapy in combination with radium or alone, according to the case and the experience of the therapist. Through this treatment an intolerable, loathsome disease is made sufferable, the bleeding and the offensive irritating discharges are lessened or stopped, the general condition improves, and life may be prolonged from one to three years. Some of these cases may even become good operative risks.

Borderline cases should be irradiated first. The advantages claimed for preoperative irradiation are that the virulence of the bacteria which infest the necrotic cancerous tissue are destroyed, thus lessening the danger of postoperative sepsis and the reduction of the tumor mass renders the operation easier. The objection raised by some surgeons to preoperative irradiation is that the operative steps are made difficult through the formation of an excess of connective tissue in the parametrium. This difficulty can be surmounted if the interval between irradiation and operation is not prolonged beyond a period of two to three weeks. Furthermore, the slightly increased operative difficulty, caused by the preliminary irradiation, is more than compensated for by the lessened bleeding encountered at the time of operation.

Of the other potentially malignant, or positively malignant affections of the uterus, in which x-ray therapy may and should be employed postoperatively, either prophylactically or curatively, are hydatidiform mole and chorioepithelioma.

Tuberculosis of the uterine adnexa, with or without associated pelvic and abdominal peritoneal involvement, renders the most gratifying results from x-ray therapy. A positive diagnosis is unconditionally required before the roentgen treatment is instituted, even if an exploratory laparotomy should become necessary in order to establish it.

Other bacterial diseases of the genitalia are thus far excluded from this form of therapy by experienced clinicians.

Married women who, on account of cardiac, renal, or pulmonary affection, must forego the blessings of maternity, can be rendered sterile by x-ray therapy, and thus be spared even the minimum risk

which the most skillful operation may entail in such cases, and not be deprived altogether of their matrimonial bliss. There is also a group of psychic and sexual disorders in which ovarian castration may form a vital indication, but great care and mature clinical judgment must be exercised in their selection. Metabolic disorders, particularly those of calcium, over which the ovary and the thyroid exercise a marked influence as well as disturbances of other endocrines are gradually coming under the sway of the roentgentherapist; further investigations will decide whether we are on the right path.

Some roentgentherapists continue to differentiate between x-ray sterilization and castration. As a matter of fact all ovarian irradiations are practical castrations, and the exception only proves the rule. This fact has induced some investigators to resort to extragenital irradiation of those endocrines which are antagonistically related to the ovary, and thus indirectly inhibit temporarily the hyperfunctions of the germinal gland. Stephan made an attempt to control uterine bleeding of oophorogenic origin through the irradiation of the spleen, which increases the coagulability of the blood. I have had a chance to observe the application of this principle in the Seitz clinic, and may state that the effects were so evanescent that direct ovarian radiation had finally to be instituted. Other clinicians claim to have obtained favorable results from irradiation of the hypophysis and the bone marrow, in cases of uterine bleeding, of ovarian or hemic origin. The question of extragenital irradiation for the purpose of influencing genital disorders must, for the present, be left open; it has been mentioned in order to show how the scope of roentgentherapy may be widened, and what potentialities still harbor within these unknown electrophysical forces, x-rays.

RESUMÉ

1. The problem of radiotherapy will not be completely solved until the biologic factors entering into this equation have been better understood and more directly controlled.

2. Individualization of cancer patients is of prime importance and for this reason surgery and radiotherapy must supplement each other, and change their rôles from predecessor to successor, from time to time, according to the mature judgment of the treating clinician.

3. The localistic conception of cancer must be modified, and malignant disease must in the light of recent advances be considered as a general affection characterized by a constitutional morphologic inferiority of some tissue.

4. The success of x-ray therapy in malignant disease is not wholly dependent upon the destruction of the tumor cells, but also, to a very large extent, upon the general cellular immunity of the organism, and upon a preservation and stimulation of the forces governing this immunity.

5. Surgery should be given first choice whenever possible. The removal of the main malignant focus and large metastatic deposits gives the economy a better chance to utilize its reserve of natural immunity in combating the remaining disorganized malignant stragglers, which must still be weakened by postoperative deep roentgentherapy.

6. The administration of deep x-ray therapy requires training and

preparation; the possession of an x-ray apparatus does not indicate therapeutic skill. From a gynecologic viewpoint, I may add that modern gynecology demands, besides a thorough preparation and mastery of surgical technic and a comprehensive understanding of the female patient in particular, also a knowledge of the main principles of radiotherapy.

7. Radiotherapy must be administered by, or under the direction and close supervision of, the clinician, in order to obtain the best results.

8. It is quite possible that some of the present day views regarding cancer therapy by means of surgery, radium, or x-rays, will undergo many changes. One thing, however, is certain, that the x-rays as one of the most important weapons in combating deep seated malignant foci will never disappear from our medical armamentarium.

REFERENCES

- (1) *Dessauer, F.*: Arch. f. Gynaek., 1919, cxi, 234. (2) *Perthes*: Arch. f. klin. Chir., 1904, lxxiv, 400. (3) *Dessauer, F.*: Med. Klin., 1905, i, 526. (4) *Juengling, O.*: Strahlentherapie, 1923, xiv, 634. (5) *Aschoff, Kroenig und Gauss*: München. med. Wehnschr., 1913, lx, 337. (6) *Perthes*: Strahlentherapie, 1923, xiv, 738. (7) *Teilhaver, A.*: Arch. f. Gynaek., 1923, cxviii, 237. (8) *Starling, E. H.*: Recent Advances in the Pathology of Digestion, W. T. Keener & Co., Chicago, 1906. (9) *Voltz, F.*: Strahlentherapie, 1923, xiv, 93. (10) *Kroenig und Friedrich*: Physikalische und Biologische Grundlagen der Strahlentherapie, Urban und Schwarzenberg, Berlin, 1918. (11) *Pickard, H.*: Strahlentherapie, 1923, xiv, 467. (12) *Quensel*: (quoted by Pickard.) (13) *Schwarz, G.*: München. med. Wehnschr., 1921, lxxviii, 766. (14) *Teilhaver, A.*: München. med. Wehnschr., 1921, lviii, 1013. (15) *Blumenthal, F.*: Deutsch. med. Wehnschr., 1921, xlvii, 1151. (16) *Grundzent, F.*: Grundriss zum Studium der Radiumtherapie, 201. Urban und Schwarzenberg, Berlin, 1919. (17) *von Bauer*: Verhandl. Berl. med. Gesellschaft., June 6, 1917. (18) *Halberstaedter und Simons*: Fortschr. auf dem Gebiete der Roentgenstr., 1922, xxviii, 499. (19) *Simons, A.*: Strahlentherapie, 1923, xiv, 106. (20) *Czcpa und Hogler*: Med. Klin., 1922, xviii, 1087. (21) *Strauss, O.*: Strahlentherapie, 1923, xiv, 81. (22) *Zondek, S. G.*: Arch. f. exper. Path. u. Pharm., 1920, lxxvii, 342. (23) *Kraus, F.*: Klin. Wehnschr., 1922, i, 1773. (24) *Kraus, F.*: Med. Klin., 1922, xviii, 1515. (25) *Hirsch, H., und Arnold, R.*: Taschenbuch der Roentgentherapie fuer Aerzte, Julius Springer, Berlin, 1922. (26) *Hirsch, H.*: Strahlentherapie, 1923, xiv, 679.

1125 MADISON AVE. N. Y.

Errata

In the article by Dr. A. B. Davis, April, 1924, the first four lines at the top of page 375 should read:

"I have employed the double flap technic in three cases and have lost one mother and her child. This mother gave one of the most horrible exhibitions of septic poisoning which has ever come under our observation."

Detailed case reports will appear in Dr. Davis' reprints and likewise in the current volume of the Transactions of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons.

The American Journal of Obstetrics and Gynecology

VOL. VII

ST. LOUIS, JUNE, 1924

No. 6

Original Communications

ANATOMICAL AND CLINICAL STUDIES UPON 875 PLACENTAE*

BY JAMES E. DAVIS, A.M., M.D., B. V. KELLOG, A.B., M.D., AND
ARTHUR L. AMOLSCHE, M.D., DETROIT, MICH.

(From the Department of Pathology, Detroit College of Medicine and Surgery.)

THIS study is a preliminary endeavor to ascertain data pertaining to maternal and fetal morbidity and mortality through routine and special methods for the examination of the placenta and umbilical cord; also by clinical controls to further accurate estimation of the significance in the histopathologic changes obtaining beyond the normal for a matured decidua organ.

Statistical estimates have assigned for United States a maternal mortality rate second highest of a large number of countries. Students of public welfare point to the fact that there has not been any noticeable decrease in this mortality for twenty-five years. In many cities, according to Levy, the percentages vary from 5.6 to 11.9 per 1000 births (1 in 178 to 1 in 84). The neonatal mortality has ranged from 23 per 1000 (1 in 43) to 49 per 1000 (1 in 20). The combined loss for mother and child in the first month reaches the appalling figure of 61 per thousand (1 in 17). It would seem urgent that all possible means from clinical and laboratory sources should be utilized and combined to further economy here in human lives.

COMPARATIVE ANATOMY

A review of the literature impresses the need of better dissemination of the knowledge concerning the evolution of the placenta if

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

certain erroneous conclusions in clinical studies are to be avoided. The comparative anatomy of the placenta contributes well to the history of its evolution and to a clearer understanding of its physiology and pathology. In the lower forms of animals belonging to the phylum chordata, placental development is not the rule, for nutrition of the embryo is provided for by the elaborate development of the yolk sac. The genesis of placental formation, however, is established in some species by a vascular union between mother and offspring, but complete evolution is not observed until the Class Mammalia is reached; here the yolk sac becomes rudimentary and the highly specialized placenta is developed.

In the Salpa, one of the tunicates, the young are nourished in the maternal oviduct by interchange of maternal materials through a rather close union between fetal and maternal vascular systems (umbilical or omphalic placentation). This illustrates placentation in its most primitive form. Other examples are found in certain viviparous sharks, certain amphibia, alpine salamander, viviparous blennies, teleostean fishes, etc. In Seps Chaleides, one of the viviparous lizards, both allantoic and omphalic development occurs. There is a communication between the embryo and yolk sac anteriorly and the allantois posteriorly, and also a communication between the embryo and the wall of the oviduct. Placental differentiation, anatomically and physiologically, is best attained in mammalia.

It has been convenient to speak of the aplacental and placental mammals. Both, however, have placentae, but the aplacentalia have no allantoic placenta, while the placentalia have both allantoic and omphalic connections formed and coexisting for some time in certain species.

In the aplacentalia are included the monotremes and most marsupials. The ova of these forms have a large amount of yolk and there is intimate connection between the walls of the yolk sac and the uterine mucosa. There are then both umbilical and omphalic placentae existing in this class.

In the placentalia most of the lower forms have the allantois much more highly developed than has man. The most primitive form of placenta has villi formed over the entire surface of the chorion—(diffuse type). This is seen in the pangolian, pig, hippopotamus, camel, chevrotian, horse, rhinoceros, tapir and whale.

Huxley divided the placentalian mammals into two primary subdivisions, named deciduata and the nondeciduata. In the first or deciduata, the uterine mucosa undergoes rapid evolution and modifications to form decidual tissue and the maternal and fetal parts become united. (Figs. 1 and 2.) In the nondeciduate forms the uterine mucosa does not undergo this evolution and consequently the union

of fetal and maternal structures is less intimate. With a few animals classification is upset. This is true of the Sirenia, dugong, in which a nondeciduate zonary type of placenta exists. Birth does not release any of the maternal tissue, and in addition part of the fetal tissue is left in the uterus to be absorbed. The placenta of the mole is not shed at



Fig. 1.—Sagittal section of uterus and placenta exhibiting fetus, (145 mm.) cord and placenta *in situ* at 4 months.

birth but becomes gradually absorbed by the mother. This type of placenta has been called contradeciduate. (Fig. 3 illustrates retained human placenta and disproportionate growth of the fetus, umbilical cord and placenta.) In the nondeciduate group of Ungulata such as the pig, the uterine epithelium undergoes an early degeneration but reappears in a short time, being formed of high columnar cells to

which the trophoblast is closely applied. The trophoblast develops protoplasmic processes between the cells of the surface epithelium of the uterus which may reach the underlying capillaries and therefrom obtain nutrition. The trophoblast, which is at first single-layered,



Fig. 2.—Uterus, placenta, cord, fetus and bisected myoma. Note decidua dissected free down to the cervix.



Fig. 3.—Placenta, amniotic sac and undeveloped fetus at ten months

after three weeks forms a syncytium. The trophoblast is vascularized through its mesothelium from the allantois which completely surrounds the embryo. There is no development of villi because the approximation surface has been increased through undulations or ridges upon the uterine mucosa, and into these the corresponding foldings of the

fetal sacs are approximated. The uterine mucosa remains intact throughout pregnancy and probably continues an active secretion. The glandular orifices cover the domes of the trophoblasts and thereby transmit their secretion which is in turn carried by the allantoic vessels to the embryo.

In the mare, as in the pig, the blastodermic vesicle is attached to the uterine mucosa by the trophoblast, but the ridges of the mucosa are very delicate and are nearly parallel, and villi are formed in the allantoic region to fit into crypts which are probably lined with maternal epithelium, for between the fetal and maternal tissues in the crypt is a space filled with secretion.

The placentae of the cow and sheep are similar in appearance, both being polycotyledonary in type. These cotyledons have prominences or localized proliferations of the trophoblast. The uterus is especially adapted to this type of placenta through a development of corresponding prominences which project as little knobs from interglandular positions into the lumen of the uterus, being known as maternal cotyledons. The subepithelial tissues are highly vascularized and during the evolution of pregnancy deep folds or crypts are formed, giving a sponge-like appearance. Into these crypts the chorionic villi with their cores of mesoblast supplied by branched allantoic vessels extend. The intercotyledonary trophoblast is avillous in both sheep and cow.

The placenta in deciduates has three types of attachment between fetus and mother: (1) centric, in which the blastocyst rests in the cavity of the uterus and when large enough is in contact with the entire uterine surface; (2) eccentric, (Figs. 4, 10) in which the blastocyst remains small and lodges in a furrow of the uterine mucosa and later forms a decidua reflexa; (3) interstitial, in which the small blastocyst attacks the mucosa at one point, and reaches the connective tissue. In this form, also, a decidua reflexa is formed. Near the attachment of the trophoblast the mucosa degenerates but the connective tissue cells enlarge to form decidual cells before degeneration begins. The maternal capillaries dilate and come into close contact with the trophoblast. The mucosa and fetal tissues intermesh so intimately that separation injures the tissue.

The carnivora have a zonary type of deciduate placenta. The blastocyst is covered early by a thick prochorion which delays adhesions for some time but later this layer is absorbed by the trophoblast. By the time this absorption process is completed the fetal ectoderm has proliferated over a broad zone of the ovum to form villousities which attack the surface of the uterine mucosa and obtain attachment to it. Vascular processes from the allantois grow into the center of the trophoblastic villi. The rudimentary placenta is first discoid, then zonary at completion. After destruction of the uterine epithelium,

the villi penetrate into the deeper mucosa by gradually absorbing the early formed trophoblastic syncytium and then branch to form secondary and tertiary divisions. The trophoblast on the sides of the villi becomes syncytial but the villous tips retain their cellular character.

In the elephant (Proboscidea) the allantois is large and vesicular and short villi are developed over a large area of the blastodermic vesicle. These villi are lodged in preexisting depressions in the uter-



Fig. 4.—Corrosion preparation of placenta showing marginal type of umbilical cord attachment. Note basket forms of assembled vessel radicles.

ine wall. The trophoblast is inactive and does not attack the maternal tissues. In a zonary area, however, longer villi develop and penetrate deeply into the maternal tissues, forming a mass of meshed tissues, and through these meshes maternal blood circulates through the maternal vessels. When the placenta is separated, villi are left *in situ* for absorption by the maternal tissues.

In rodentia the placental attachment has numerous variations, for

in the rabbit it is centric, in the mouse and rat excentric, and in the guinea pig interstitial. The ultimate form of placenta in these types is discoid.

In primates—monkeys, apes and man—the placenta is essentially the same, except for differences in size and form of villi and the structure of the decidua. The primates are distinguished from all other placental mammals in that they do not form an allantoic placenta. The placenta of the monkey, as in man, is discoid.

SPECIMENS STUDIED

The materials necessary to carry on this investigation were generously placed at our command by the Detroit College of Medicine and Surgery, Providence, Herman Kiefer, Woman's and St. Mary's Hospitals of Detroit. It was found convenient and practical to divide this material into three groups: one, for miscellaneous trials and observations; here 200 placentae of various ages, conditions of preservation, pathology, types, attachment, detachment, etc., were utilized.

The second series, numbering 175, was studied by using three procedures: first, the venous and arterial circuits of the organ were freed from blood by means of water under ordinary hydrant pressure connected with the placental vessels, first in the vein, then with each of the arteries, then aided by propelling massage with the hand. The second endeavor aimed to inject the venous and arterial divisions of the placental circuit with contrast dyes suspended in a medium solidifying at room temperature, or by a suspension of barium after which x-ray pictures were taken to delineate the vessels and demarkate places of obstruction to complete dissemination of the injected opaque material. The third procedure was to make use of a corrosion fluid after the blood circuit had been filled by a dye preparation insoluble to the corrosive action.

The third division of placentae, 500 in number, was studied microscopically, grossly and clinically by utilization of any or all special procedures deemed applicable.

TECHNIC

In the injection work difficulties were encountered because the placenta, when detached, had no longer a closed blood circuit and because it had always been subjected to more or less traumatism and its decidual nature provided irregular degenerative changes. Further it was observed that the almost constant practice of aiding placental expulsion by the Crede manipulation added markedly to the circuit blocking. After trials with warm normal salt solution at 40° C. under gas pressure of 150 to 175 mm. of mercury for washing the placenta outside and also within its blood vessels, it was found that better

results were obtained with tap water at 40° C. without additional pressure to that supplied by the city pumping station. The flow of washing fluid could be kept going as long as desired and when combined with propelling massage proved quite satisfactory. The result of this simple procedure gave a pale, bleached-out appearance to the organ, excepting in the areas of tissue change and circuit blocking. These areas were sharply contrasted in pink or red from the straw color of the parts which washed free of blood.

An ideal preparation of the placenta for its gross examination can be made if the washing is done as above suggested, followed by fixation in 10 per cent formalin for a few days. Then thin sections can be easily made with a long knife and, if desired, selected areas for microscopic study are taken—thereby a very satisfactory complete examination is finished—providing valuable data applicable to both mother and child.

The following factors were found to hinder or make impossible complete washings:

1. Failure to begin washing immediately after delivery.
2. Marked spiral winding of the cord vessels or true and false knots.
3. Inability to quickly overcome the vessel wall contractions.
4. Lacerations of the maternal surface.
5. Degenerative and edematous changes in the vessel walls and placenta.
6. Recent and old infarctions prevent washing of the respective involved areas.

The technic for washing may be outlined as follows: The cord is cut six inches from the placenta and placed in potassium oxalate solution to retard clotting on the maternal surface. The washing is commenced within five minutes after delivery, using warmed tap water to 40° C. at hydrant pressure, connecting first with the vein, then each artery as soon as possible to get rid of the greater mass of blood. The blood in the larger vessels is expressed by pressure of the hand upon the cord vessels.

The walls of the placental vessels do not have a high degree of irritability and are easily distended, but the arteries of the cord have very irritable muscle tissue which usually shows marked contraction changes, and dilatation is consequently often slow. If clotting is to be prevented and thorough washing accomplished, the tendency to contraction must be quickly overcome. Advancing pressure with the fingers as the water enters the vessels will hasten dilatation. The use of potassium ferrocyanide as an aid to dilation is of little value. The completely washed normal placenta is colorless or a pale straw color throughout.

The injection masses used consist of a water suspension of barium sulphate 100 gm. to 500 c.c. or barium sulphate in colored gelatin in the same proportions. (Figs. 10, 11.) The colored celloidin is prepared with acetone 100 c.c., celloidin 2 gm., camphor 8 gm. Alkanin and crystal violet-brilliant green are used as coloring materials. The barium requires a pressure of 175 to 200 mm. of mercury. Colored gelatin masses required 150 to 175 mm. Celloidin masses require 250 to 300 mm.

Corrosion is accomplished with 75 per cent HCl in from 12 to 20 hours. Hardening is done with neutral formaldehyde solution and by graded increasing concentrations of alcohol. Clearing is completed in oil of wintergreen. (Fig. 4.)

VALUE OF THE PREPARATION

The preparations obtainable are distinctly valuable in setting forth the more interesting anatomic features of the placenta and also in demarkating many pathologic changes in the gross specimens. (Figs. 12, 13.) Persistent obstructions within the venous and arterial blood beds are definitely visualized. Abnormal arborizations are plainly defined. The amount of functioning placental parenchyma is quite accurately shown. (Fig. 13.) The bursting pressure or canalization wall resistance can be relatively standardized.

The two arteries and one vein with the arteries usually coursing in a spiral manner about the cord to the point of insertion where there occurs an anastomosis between the two, is clearly shown. The cord arteries are distinctly thick-walled and of relatively small diameter; the musculature retains a high degree of irritability for several hours after placental separation. The vein of the cord is thin-walled and of large caliber, the musculature of the wall being thin and lacking in muscle irritability.

The arteries, after the first anastomosis (which may occur in the cord but is usually at the level with its insertion) divide dichotomously into radiating series of vessels, at first three or four large branches, situated immediately beneath the amnion (radiating basal arteries), (Fig. 5) and pursue a sinuous course to points not closer than 2 cm. from the placental margin where they turn abruptly into the placenta as perforating arteries and there divide into a large number of capillaries, forming an intricate "whirl," having the appearance of a tuft of hair (Figs. 4, 6, 7). These tufts, which form the basic supply of each cotyledon provide a large number of fine capillaries which penetrate the branching villous tree of which the maternal surface of the cotyledon is constructed. The arteries are more superficial than the veins and appear somewhat like the spokes of a wheel extending in a tortuous and undulating course similar to that

observed in the umbilical cord (Fig. 7). Certain basal arteries form a bent handle-like convexity which show plainly at the margin of the placenta bounding the chorion frondosie zone (Fig. 6). The accompanying veins show a similarly constructed and arranged division of tributaries which follow the arteries, only a few millimeters apart. The basal veins are larger and deeper than basal arteries. At the placental margin they form a series of festoons (Fig. 7).

It is our impression that there is an anastomosis between the arterioles and venules of the cotyledal tuft before the villi are reached,



Fig. 5 —Unioval placenta completely injected from the vessels in one cord.

since a return flow of color injection masses is seen in the venous system before the villous vessels show injection.

The vascular tuft in each cotyledon is separate and distinct from the neighboring tufts since injection of barium sulphate into the perforating arteries does not produce injection of the vessels of cotyledons supplied by neighboring radiating arteries. When the umbilical cord has the excentric type of insertion, one artery is larger than the other and usually divides into two branches of large size distributing to the larger part of the placenta, but the second artery which is smaller than the first has very small branches that distribute to the smaller zone. If the cord insertion is marginal a crow's foot

divergence of vessels is seen upon the fetal surface (Fig. 4). In the velamentous type of cord insertion the vessels course very directly through the velamentous portion to the fetal surface of the placenta.

TYPES OF PLACENTAE

In placentae with centrally inserted cords each artery supplies approximately half of the placenta (Fig. 7).

In placentae with eccentrically inserted cords one artery usually supplies two-thirds to three-fourths of the placenta, while the other artery supplies the remainder (Figs. 4, 5).



Fig. 6.—Barium injection showing walking stick marginal vessel forms and distinct basket arrangement of cotyledon vessels.

In placentae with marginal insertion and those with velamentous insertion, the distribution may be approximately equal or one artery may supply but a small area (Figs. 4, 5).

In twin placentae of uni-oval type there is a direct anastomosis on the fetal surface between the arteries of both cords but no evident anastomosis between individual cotyledons (Fig. 5).

In twin placentae of bi-oval type there is no anastomosis between the vessels on the fetal surface nor between adjacent cotyledons along the line of placental union (Fig. 8).

The types of placental vascular distribution are revealed by maceration preparations of the small, thick types of placentae which show closely assembled and densely matted arrangement of cotyledal "whirls" without distinct lines of demarkation (Fig. 9). The large, flat placentae, and especially the placenta membranacea, exhibit cotyledal vascular tufts which are distinctly isolated from one another by wide spaces. The areas with atrophied cotyledons are represented only by larger veins and arteries without the whirl of capillaries. The two types show a relatively equal capacity.

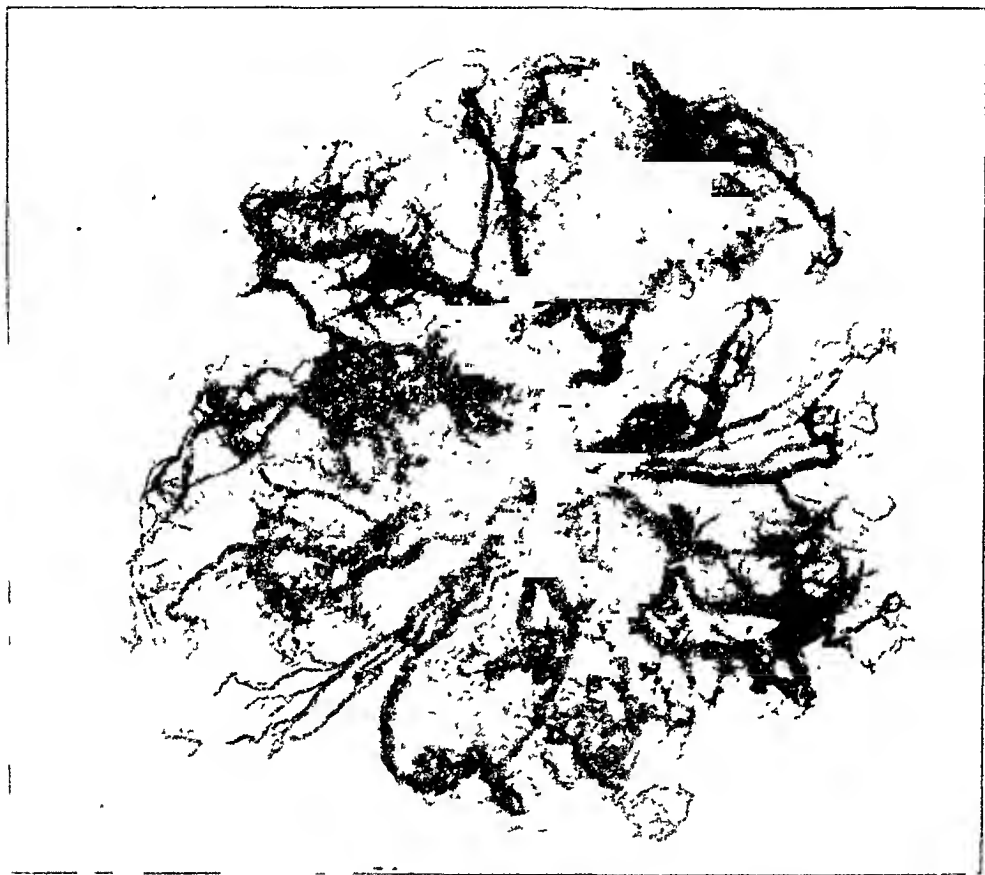


Fig. 7 —Injection of the larger arteries, veins and dichotomous branches—centric cord attachment.

In the canine type of placenta there are multiple and isolated organs arranged in paired annular flat discs which divide the bicornate uterus into a series of compartments, each occupied by two fetuses in separate sacs and of opposite polarity. Each placenta exhibits a cylindrical maternal attachment surface about 1.5 cm. wide. It is united to its neighbor by the truncated end so that each pair of pups with placentae constitutes a nutritive unit. The umbilical cords are very short and are inserted in a velamentous fashion, there being two large veins and two arteries transversing the velamentous tissue. Each pair of placentae is attached to the decidua where the larger uterine segmental arteries have their distribution.



Fig. 8.—Bioval twin placenta. Normal pregnancy. Barium sulphate injection of one placenta to demonstrate the absence of anastomosis.

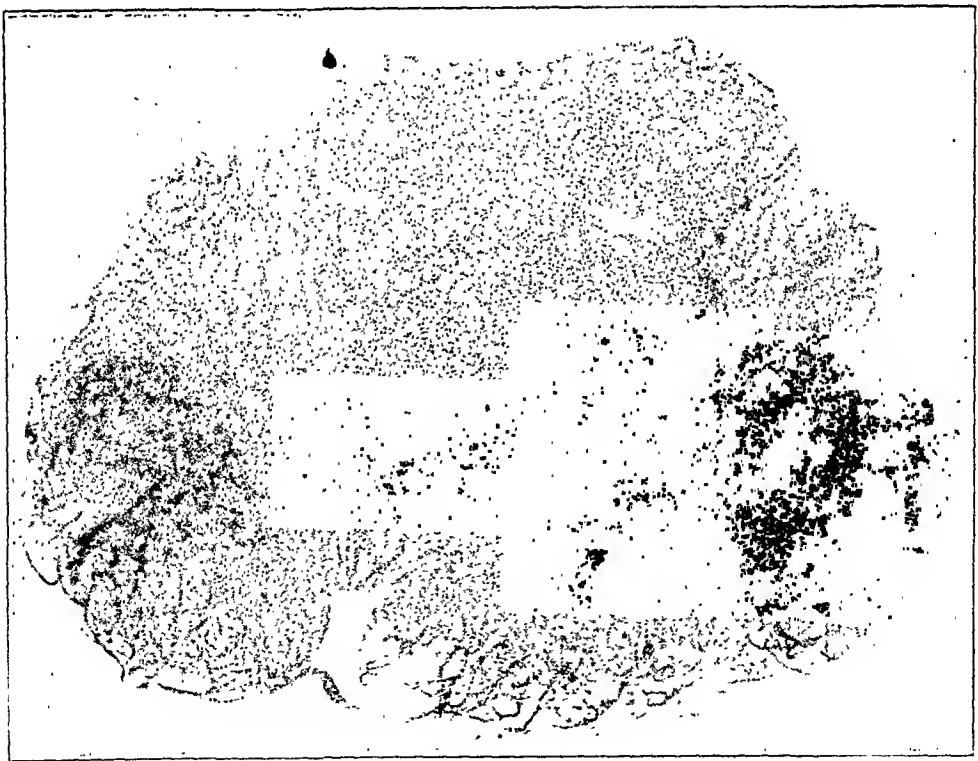


Fig. 9.—Barium injection of arteries and veins of syphilitic placenta.

The simple preparation of the placenta by washing and formaldehyde fixation could be easily done by a nurse in a short space of time and is of practical clinical value as is also the simple opaque mass



Fig. 10—Succenturiate type of placenta. Barium sulphate injection, moderate ex-centric cord attachment.



Fig. 11—Placenta with complete barium sulphate injection. Note hook of external blood supply.



Fig. 12.—Placenta from a case of eclampsia, demonstrating cotyledons which are totally or in part infarcted. Barium sulphate injection.

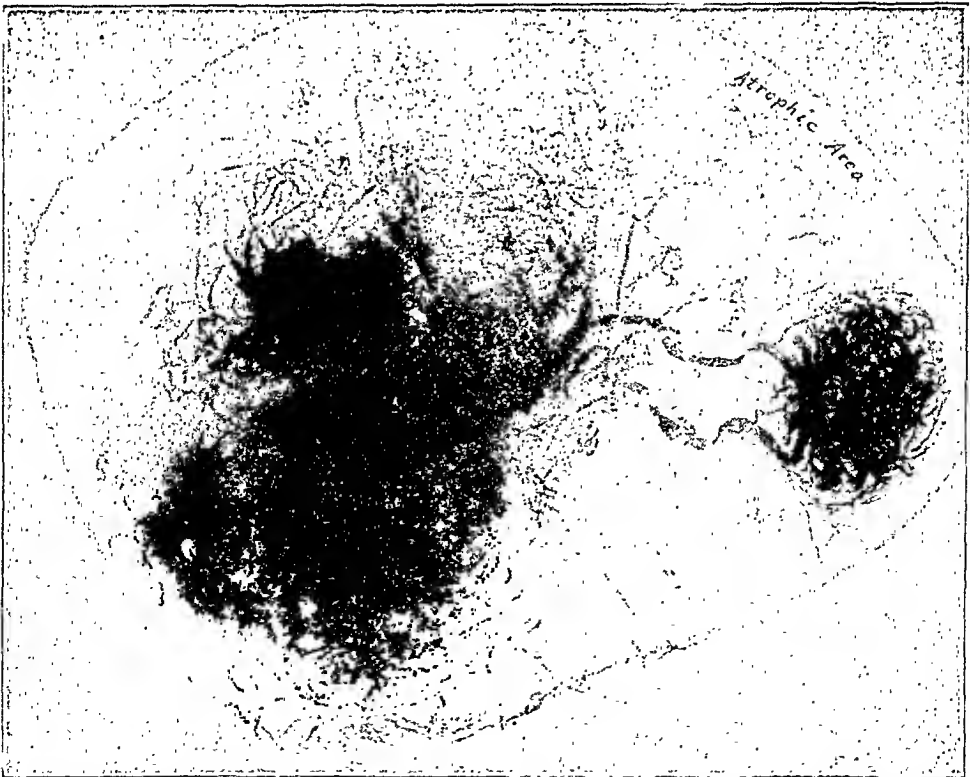


Fig. 13.—Placenta of interstitial nephritis. Note the extensive atrophy of placental parenchyma and outline of preserved atrophic vessels.

injection for x-ray records. The gelatin and celloidin colored mass injection followed by corrosion requires careful and patient technic but is of marked value for teaching purposes (Fig. 4).

GROSS EXAMINATION

The gross examination of unwashed placentae has not been satisfactory. When the cord has been ligated promptly after birth the



Plate A.—Section of fetal and maternal placenta. 1, Zone of chorionic villi; 2, zone of chorionic membrane; 3, zone showing decidua reaction of myometrium; 4, area of necrosis; 5, attached fibrin mass within decidua space.

weight is increased and the general appearance suggests congestion. The degenerative decidua changes are quite variable. Not infrequently a placenta at six months may be as extensively degenerated as another at nine months. Fusion of cotyledons should be discriminatively judged as to its pathologic significance. A thin maternal surface fusing is of no significance, except to indicate rapid ageing and rapid calcification, but firm lateral cleavages with contraction, atrophy and contiguous blood vessel changes are significant. Degenerative changes

in the amnion are commonly recognized by a loss of flexibility which imparts a parchment-like character to the membrane. Adhesions of the amnion are quite certainly indicative of inflammatory changes. Pigmentation of the membrane, particularly when of a muddy greenish character, is usually indicative of infection. Calcification may signify previous hemorrhage, infection, rapid ageing, or a combination of all of these conditions. Necrotic areas may be interpreted as a



Plate B.—Blood stasis in enlarged decidual spaces. Clotting and infarction may follow.

result of infarction, infection, or as a feature in ageing changes (Plate A). Infarction changes are the most frequent of all lesions in the placenta and are to be regarded as both physiologic and pathologic. Their size, age, position and duration are of importance. When situated centrally and disturbing a large area of blood supply the result is disastrous to the fetus (Plate B, Fig. 14). Cysts are not of great significance unless quite large. They usually form in the areas of infarction or hemorrhage (Fig. 14, Plate A). Cystic degeneration of

the chorionic villi distributed quite uniformly over the branches of the chorionic stems is to be recognized as a chorionatous tumor mass (chorioepithelioma benignum).

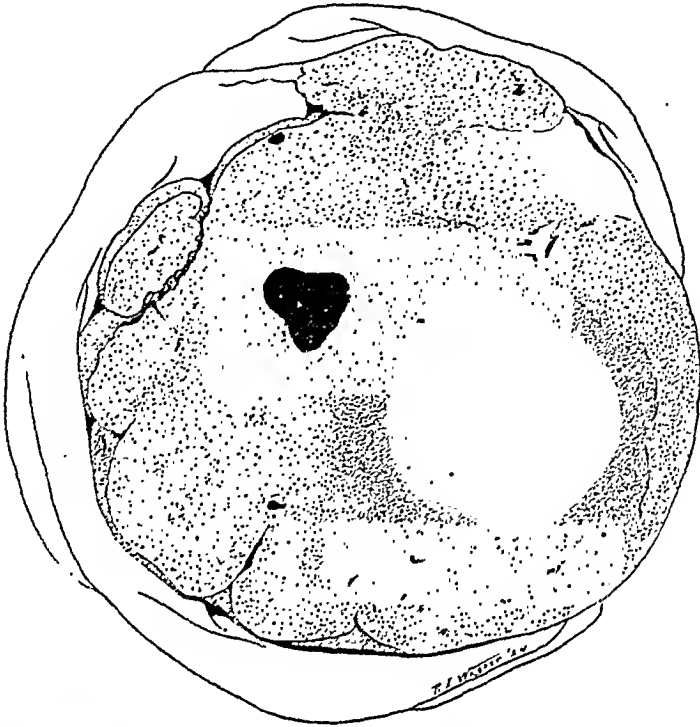


Fig. 14.—A large placental hemorrhage exactly simulating the more frequently observed small hemorrhages which are often mistaken for red infarctions.

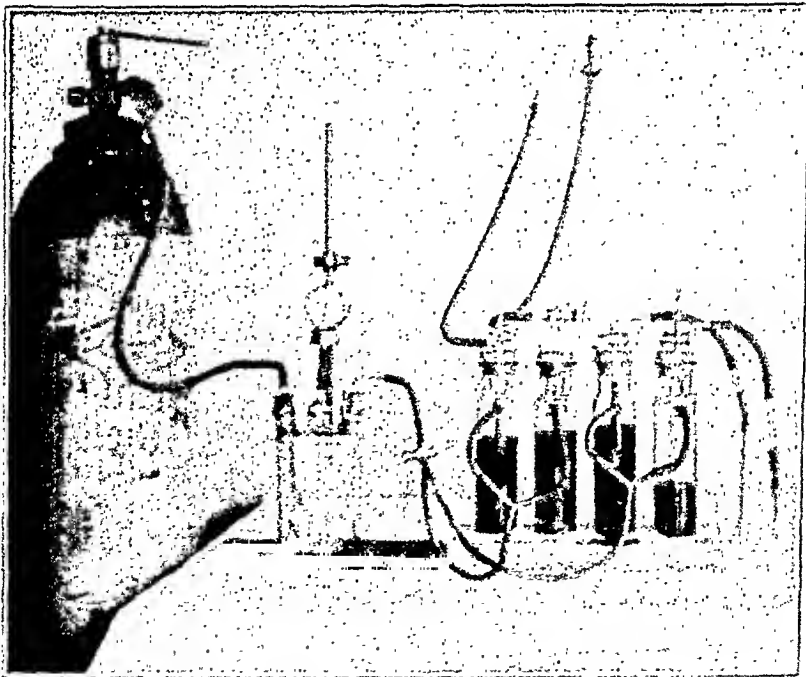


Fig. 15.—Apparatus used for infecting placenta.

The third and largest group of placentae was used for a combined clinical, gross and microscopic study and features of interest for each have been arranged in Tables I, II and III.

TABLE I
CLINICAL DATA—424 CASES

Normal	19.60%
Abnormal	80.40%
Carious teeth	37.02
Antrum infection	0.235
Puerperal sepsis	2.12
Luetic infection (positive Wassermann)	.40
Lung infection (during pregnancy)	4.95
Ophthalmia (baby)	1.65
Diabetes mellitus	0.97
Eclampsia	1.18
Albuminuria	28.25
Hypertension	36.55
Edema	34.67
Thyroid hypertrophy	16.27
Placenta previa	1.18
Abortions (Previous Abortions 10.8%)	1.18
Premature childbirth (previous premature labor 2.59)	16.5
Stillbirths	5.66
Puerperal insanity	0.47
Mortality of mothers (during puerperium)	0.707
Morbidity of infants	35.61
Mortality of infants during puerperium	4.00
Nephritis	1.65
Pyelitis	.47

TABLE II
GROSS PATHOLOGY—500 CASES

Normal	79.6%
Infarction—white	72.4%
Abnormal	20.4%
Infection-undifferentiated	2.6
Greenish discoloration of membranes	2.6
Amnion-Adherent	1.0
Edema	1.6
Calcification apparently excessive	10.8
Cotyledons fused (Fig. 9.)	10.2
Adherent blood clots, large size (Fig. 14)	7.0
Cysts (Total number 24, 4 mm. to 6 x 4 cm. in size)	2.8
Battledore type placenta	15.4
Succenturiata placenta (Fig. 10)	1.2
Placenta previa	1.0
Excessive laceration of placenta	5.0

TABLE III
MICROSCOPIC PATHOLOGY—500 CASES

Normal	
Abnormal	58.40%
Infection (including deciduitis, and omphalitis) (Fig. 2)	32.00
Lues (6 cases or 1.2% histologically characteristic) (Fig. 9)	1.6
Blood vessel changes (extreme) (Fig. 13)	6.4
Edema (marked)	3.6
Congestion (extreme)	0.8
Degeneration (marked)	4.2
Fibrosis (excessive)	0.6
Calcification (excessive)	2.4
Hyalinization (excessive)	3.8
Atrophic and ageing changes (marked) (Fig. 13)	1.0
Necrosis (marked)	2.8
Infarction, excessive, white (Fig. 12)	12.0

ANALYSIS OF TABLES

Table I has been assembled from the records of 424 cases with available histories, while the gross and microscopic tables include the placentae from the foregoing group with 76 additional cases, making a total consecutive number of 500. In the clinical table it is shown that 19.60 per cent of the cases gave no evidence of general pathology while in the hospital for confinement, nor had they any record of abortions, miscarriages, stillbirths, neonatal deaths or previous puerperal pathology. The entire group of 500 cases was material from Providence Hospital where the patients were mostly of the self-supporting, intelligent urban type. A small number, however, were young illegitimate primiparas. Yet, judged by rigid microscopic standards, 33.6 per cent of the group of 500 gave evidence of reaction to infection in the placenta amnion or umbilical cord. Only 1.2 per cent of these gave histologic or serologic evidence of syphilitic infection.

The gross appearances of the cord and placenta gave conclusive evidence of abnormalities in but 20.4 per cent of the 500 specimens. White infarction was observed in 72.4 per cent, but when checked with microscopic and arbitrary criteria for normality, it was found that only 12 per cent showed this condition present to an excessive degree (Fig. 12). Edema of cord and placenta in most instances should be interpreted as only one sign indicative of syphilis. This holds true in certain cases where the Wassermann reaction is negative and the histopathologic changes are not confirmative. There are examples of hereditary maternal lues and also of salvarsan treated mothers that are at times exceedingly difficult to diagnose. The diagnostic criteria for the recognition of spirochetal infection by the placenta when the cases are vigorously treated are unsatisfactory, excepting as one succeeds in finding the organism. The gross appearance of placental pathology is suggestive (Fig. 15) and when considered with the clinical history and followed by a microscopic examination diagnosis can be satisfactorily made. Deformity, discolorization, laceration, premature maturation, irregular density, fibrosis, excessive calcification, hemorrhage, and localized tissue increase or decrease are guides for the gross diagnosis.

In Table I, it is shown that albuminuria was observed in 28.25 per cent and hypertension in 36.55 per cent of the cases. The mothers who had had previous abortions and previous premature labors constituted 17.68 per cent. The combined morbidity and mortality of infants was 39.61 per cent, mortality during the puerperium being 4 per cent. In Table III, the total percentage of infection is 33.6 per cent, which at first thought appears unreasonably high, but it will be

observed that this corresponds quite closely with the clinical data indicative of pathology.

A careful standardization of the microscopic pathology in the placenta has not yet been made. A painstaking study of thousands of specimens would be required to safely guard against misinterpretations.

From this series a comparison of changes obtaining in cases of positive syphilis, interstitial nephritis and nephritic toxemias will exhibit that certain data obtained have only relative diagnostic values.

<i>Obliteration of blood vessels</i>	Syphilis	6	(3 very marked)	6 cases
	Interstitial nephritis	1	(not marked)	3 cases
	Nephritic toxemia	2	(not marked)	2 cases
<i>Endarteritis</i>	Syphilis	4		6 cases
	Interstitial nephritis	0		0 cases
	Nephritic toxemia	0		0 cases
<i>Edema</i>	Syphilis	4		6 cases
	Interstitial nephritis	0		0 cases
	Nephritic toxemia	0		0 cases
<i>Close assembling of villi</i>	Syphilis	4		6 cases
	Interstitial nephritis	1		0 cases
	Nephritic toxemia	1		0 cases
<i>Increased cellularity</i>	Syphilis	5		6 cases
	Interstitial nephritis	3		0 cases
	Nephritic toxemia	0		0 cases
<i>Inflammatory changes</i>				
(Chorionitis (3) Deciduitis	Syphilis	3		6 cases
(3) omphalmitis, fibrosis (3)	Interstitial nephritis	1		0 cases
	Nephritic toxemia	1		0 cases

CONCLUSIONS

1. A knowledge of the comparative anatomy of the placenta will prevent certain misinterpretations of its pathology.

2. Simple washing of the venous and arterial blood circuits by water at hydrant pressure with the addition of gentle hand massage will prepare the tissue for a more satisfactory gross examination and will also provide for the selection of better sections for microscopic study.

3. Placentae that have been washed free of blood and then injected with a simple opaque material like barium sulphate, and then photo-

graphed from x-ray negatives provide very satisfactory preparations for the detection of obstructive areas in the blood circuit, as well as atrophic changes in the parenchyma.

4. Injection of the cleared blood circuits of the placenta by colored gelatin preparations and corrosion of the tissue outside the circuits prepares excellent specimens for anatomic study of the canalization architecture.

5. Careful gross and microscopic examinations of the placenta with clinical correlation will provide excellent and quite reliable data for prognostications upon the immediate and ultimate health of both mother and child.

REFERENCES

Assheton: Trans. Roy. Soc., London, 1906, cxviii. *Marshall, F. H. A.*: The Physiology of Reproduction, Longmans, Green and Co., London, 1910, 357-489. *Parsons, F. G.*: Ency. Brit. 11 ed. xxi, 692. *Kingsley*: Comparative Anatomy of Vertebrates, 2nd ed. 1917, 379-385. *Luciani, L.*: Human Physiology, 1921, Chapters V and VI. *Levy, J.*: Am. Jour. Public Health, Feb. 1923.

111 JOSEPHINE AVENUE.

THE SERUM TREATMENT OF PUERPERAL SEPSIS*

By HAROLD BAILEY, M.D., F.A.C.S., NEW YORK, N. Y.

THE review of maternal death rates during the last quarter of a century shows that there has been practically no reduction in the proportion due to sepsis. In England and Wales the rate of deaths per thousand from puerperal sepsis through this period varied from 2.1 to 1.3, but from 1908 to 1912 the rate was as low as 1.4 per thousand. These rates are lower than those for the United States. In 1917 the rate here was 2.7 per thousand as against 1.3 for England. The explanation is not at hand as to why these deaths should be more prevalent in this country unless it is that the larger population in the rural and village districts receives treatment inferior to that of the crowded communities. Eichel¹ has shown that this is so as regards New York. The rate from 1916 to 1920 was, for the city 1.35 as against 2.02 for the state outside of the city. He has also indicated that the rate for deaths from all puerperal causes is higher for cities and villages over 2,500 in population than it is for the rural districts. This is explained possibly by the greater proportion of operations occurring in small communities with hospital facilities. In the country the practitioner or midwife is alone and operative delivery is thought of only as a last resort. Statistics show that 40 per cent of all fatal septic cases have had some sort of operative interference.

*Read at a meeting of the New York Obstetrical Society, January 8, 1924.

The seasonal variation in the death rate from sepsis suggests that it is correlated with the higher death rate from the ordinary diseases of the fall and winter months. The sharp rise in infectious diseases, and especially tuberculosis, through the years 1917 to 1920, as shown by the same statistician, would indicate that the war had a very definite bearing on the prevalence of infections in general. Because of the greater possibilities of contamination and inoculation with the streptococcus, the puerperal septicemia rate might well be expected to rise coincidentally with that of other infections, or possibly somewhat later, as the organism became more virulent through transfer from individual to individual. No doubt the influenza epidemic was a contributing factor in the production of the increased septic rate. In the United States Registration Area the death rate rose fifteen points during these three years and as 25 to 30 per cent of the deaths are due to sepsis it is apparent that this rate would also rise. If we look back to the epidemic of 1889 to 1890 we find that in England and Wales it was followed by an increase in the death rate from puerperal sepsis. Lea² presents a chart showing an increase from 2.2 to 3.3 per thousand during the years 1890 to 1895. Eichel's chart for New York City, 1916 to 1920, does not show this increase as regards septicemia but does show the same general rise in the deaths from all puerperal causes. In 1920 and 1921, in several hospitals in Manhattan Borough there was an increase in the cases of puerperal infection. Investigation showed that other large cities of the country were suffering from a similar increase in the septic rate. While at no time the disease assumed what might be termed, in speaking of general infections, an epidemic form, nevertheless it appeared sporadically during the winter months of each year. At Bellevue Hospital the cases with one or two exceptions occurred in the nonoperative group and many of the women had not been examined. This unexpected condition was also evident in other hospitals, in the group of Maternity Center patients of whom a special study was made. From 1919 to 1921 the rate became 2.2 for Manhattan Borough and 1.9 for the Maternity Center group of 8700 deliveries. In the winter months of 1921 we noticed at Bellevue Hospital that a number of the women at the time of the fever had a sore throat. In one instance, at least, streptococcus was obtained from the inflamed tonsils. Through these two years on my service no vaginal or rectal examinations were permitted except in cases of delayed or abnormal labor and with one exception—a cesarean for placenta previa—there were no deaths from sepsis in the patients who had operative deliveries. Exogenous infection being ruled out with more or less certainty, it may be that the infection was brought about from the virulent streptococci present in the patient's genital tract. This point is stressed because the five-year rate of 1.3 per thousand in the greater city is probably a low level beyond which there will be

slight, if any reduction. With the general dissemination of such a germ as the streptococcus it would seem reasonable to expect in 1,000 cases, at least, one fatality from puerperal sepsis, for in such a series there will be many bleeding or operative cases in which the uterus must be entered.

Cases residing in the hospital before delivery have a low percentage of streptococcus in the vulva and vagina, 14 and 8 per cent respectively, according to Whitridge Williams and his coworker, Dr. Willa Frick;³ while in the outdoor patients 75 and 55 per cent, respectively, was found in these areas, and a third of these bacteria were of the hemolytic type. It would appear possible that these percentages might be due to the indulgence in sexual relations by the outdoor patients. The practice should be emphatically prohibited, and the dangers of it made a distinct feature of the prenatal education of these women. This subject has considerable importance also in relation to stillbirths and the deaths of the newborn, for there is no doubt that pelvic congestion leads to premature deliveries with the consequent added risk to the fetus.

The first group of septic cases appeared in 1921. We made no use of the antistreptococcus serum because for many years its value had been considered doubtful. The cases in 1922 were given a polyvalent antistreptococcus serum prepared by Dr. Frank Huntoon from many sources of streptococcus infection in man. We wish to take this opportunity to thank the H. K. Mulford Company for providing us with this serum.

HISTORICAL

Since Pasteur in 1879 cultivated the streptococcus from a case of puerperal infection it has been generally admitted that the majority of all fatal infections is due to this organism, the remainder being due to the staphylococcus, colon bacillus, and mixed infections, or occasionally other bacteria such as the bacillus Welchii. The suggestion of producing a serum or antibody to combat the staphylococcus infection was made by Riehet and Herieourt as early as 1888. The idea was put into practice as regards the streptococcus by Marmorek⁴ in 1895, and he produced a serum which he believed to be valuable in all types of streptococcus infection. He rendered the streptococci virulent for the horse which is more or less immune to streptococcus from human sources, by passing the strains through smaller animals and thus by gradual dosage producing immunity. Rabbits which are susceptible to the toxin of the streptococcus were injected with the horse serum thus produced and in this way protected against several times the fatal dose of the bacteria. He injected the serum into seven puerperal women who had a straight infection of streptococcus and all recovered. Of eight other women who had mixed infections five died.

Two factors became evident in his work: (1) the strain of strepto-

coccus might be so virulent that the serum would have no effect; and (2) the injections of the serum might be valueless if made too late in the disease.

Almost at once (1896) Van de Velde⁵ produced a polyvalent serum by immunizing the horse with a number of strains of streptococcus; his argument was that the antibody from one strain might be of no value against the same bacteria with other cultural manifestations. However, the single strain serums of Marmorek and Arohnson were those generally used and the amount administered to any one woman was little—10, 20 and 22 c.c. for a single dose. Bar and Tissier⁶ used the serum in twelve cases with a 50 per cent mortality. In 1899 a committee of the American Gynecological Society with Whitridge Williams as chairman,⁷ reviewed the 352 cases in the literature of the subject up to that time and found a mortality of 21 per cent. In 101 cases in which the bacteriologic examination showed streptococcus the mortality was even higher—32.6 per cent. The question arose among other obstetricians as well as among the members of this committee, as to whether the serum itself aided in producing this high mortality. The committee concluded that the serum did no harm but was of little use in the disease. While this report certainly stopped the use of the serum, except in occasional cases, it nevertheless accomplished a great good, for Williams pointed out that many cases had been curetted or had had other uterine treatment, and he counseled against any intrauterine manipulations in puerperal sepsis. The French formally declared that they did not accept this view, but in America, after a period of ten years, a time apparently necessary for its dissemination, the idea was generally accepted.

During the period 1900 to 1920 there were very few clinical workers in this field. However, several of the large drug houses in this country and on the Continent put polyvalent serums on the market and occasionally a clinical report of a case in which the serum was used appeared in the literature. Great credit should be given to Arohnson and also to Neufeld and Rimpau and Meyer and Ruppeld who studied the subject of serum therapy. As a result of their work it was generally accepted that the strains should be obtained from various sources of infection acknowledged in man and also that a polyvalent product was necessary because of the difference in virulency. The differences that exist between various strains of hemolytic streptococcus and the fact that sepsis occurs from infection by nonhemolytic organisms shows the necessity for a serum sufficiently polyvalent to cover the majority of such strains. Since 1900 great strides have been made in the bacteriologic fields, the studies of anaphylaxis, immunity, the opsonic power of serum and vaccine therapy have given impetus to the serum treatment of streptococcus and other infections. Hektoen⁸ in 1906 suggested that the value

of the serum and vaccine supplied to the trade was doubtful and he intimated that such substances should be under better control because of their deterioration by age and other factors. In 1909 Park, in order to prepare an efficient serum, injected a horse with a number of strains of streptococci recovered from women dying of puerperal fever. This serum was used until the horse died at the end of several years. No decided clinical evidence of its value was published and after the death of the animal no new serum was prepared. However, I had three cases of my own and three of which I had indirect knowledge of severe sepsis seen in the hospital or in consultation practice, that recovered after injection of this serum. Several of these women showed a drop in temperature within twenty-four hours. The bacteriologic diagnosis of the cases had not been made.

In 1911 Weaver and Tuncliff,⁹ following the suggestion of Hektoen, examined five samples of polyvalent serum and found that four showed evidence of value by raising the opsonic power against virulent streptococcus injected into guinea pigs.

The advent of the use of pneumococci serum gave impetus to the production of an efficient immune serum against streptococci. Since the dose of serum in pneumonia amounts to 100 c.c. and is given at intervals of 12 to 24 hours, it would seem advisable in streptococcus infections to give 100 c.c. of the serum at least every 24 hours, and this also agrees with the suggestion of Weaver and Tuncliff that the dose of antistreptococcus serum must be large as the reactivation of inactive serum occurs at very low dilution.

The only article in the literature concerning the use of the serum by this modern method is by Philip F. Williams¹⁰ of Philadelphia who, in 1921, treated with large doses four cases of postabortal hemolytic streptococcemia from which the organism was recovered by blood culture. There was an almost immediate change in the temperature curve of these patients and all finally recovered. The serum used was the polyvalent serum of Mulford which was obtained from the drug room of the hospital.

BIOLOGIC ACTION OF THE SERUM

The toxin produced by the streptococcus has not been isolated. Its action not only causes profound illness in the patient but it has also, in many instances, a direct effect on the blood cells producing an hemolysis with consequent shock and anemia, thus adding to the severity of the disease. McLeod and McNee¹¹ have stated that the hemolytic and general toxins are closely allied and possibly identical. The hemolytic streptococcus infections are more serious and carry a high death rate; however, the nonhemolytic variety of the strep-

toecoccus may produce death, while the hemolytic variety may exist in such areas as the vagina, in women who are apparently normal.

The search, of course, has been for an antitoxin which would neutralize the poison from these bacteria. It is now generally considered but no such body exists. There are, however, certain antibodies that have a considerable power in checking the progress of the disease. Complement fixing immune bodies are present in the serum of animals immunized against the cocci and agglutinins also are present, but most important of all is the presence of an immune opsonin. It is possible that in a protective serum there also exists a direct antitoxin as yet unknown. The immediate drop in temperature that is sometimes seen following its use would indicate that such a substance actually exists in the serum. The exact relationship of these bodies to the therapeutic value of the serum is unknown but the general tendency is to place faith in the presence of the immune opsonin and the increase in the phagocytosis that follows the injection of such a serum. There is no doubt that in a large proportion of the cases of streptococcemia there is produced by the bacteria an aggrassin which tends to inhibit phagocytosis. Clinically this is made evident in the more virulent forms of the infection by a low leucocyte count. Some of the fatal cases in our series in 1921 had a leucocyte count of six and eight thousand at the height of the disease. The presence of a bacteriotropic substance—that is, one that renders bacteria subject to phagocytosis or one that increases the opsonic index possibly by acting directly on the leucocytes—is easily demonstrable by obtaining the opsonic index before and after the injection of the serum in infected laboratory animals.

Denys and LaClef¹² in 1895 and Neufeld and Rimpau¹³ in 1905 were able to show this property of the serum and later Wright described the methods of determining the opsonic index. Since this time it has been demonstrated that in infections in which the disease is rapidly cured the opsonic index is high, while in those in which the disease is fatal it is below normal.

In 1911 Weaver and Tunccliff, in the article mentioned above, found that with active serum the opsonic index was raised and persisted for eight or ten days, and that the increased leucocytic activity that occurred in the first 24 to 48 hours after the injection was specific against streptococci. As a control they used a normal horse serum and found that, injected in increasing amounts, it produced no alteration in the opsonic index and no increase in the phagocytic power of the leucocytes. They found that serum kept in an ice box for a month lost its power of opsonizing virulent streptococci, but that the power could be restored by the addition of fresh normal human serum or guinea pig serum. The property of reactivating

the serum is present to a higher degree in the human serum—in the proportion of 1 to 160 as against 1 to 10 in the guinea pig serum. They explained that this may indicate that the serum exerts a greater protective and curative power in man and finally that the protective power of the serum continues only so long as it can be reactivated.

METHODS OF PREPARATION

The serum used in the cases reported was prepared in the Mulford laboratories by Dr. Huntoon. Horses were repeatedly injected with a mixture of strains so selected as to cover the majority of hemolytic streptococci not only from the serologic classification but also from the disease sources. After the immunization was well under way the horses were tested weekly against the immunizing strains and the immunization doses were then balanced so as to increase the amount of antigen of those strains which tested lowest. This resulted in raising the titre against those strains thus producing an evenly balanced serum. Since the strains employed were selected as representative of immunologic groups—as shown in agglutinin absorption tests—the antibody produced is not only active against the homologous strain but also against the other members of its group. Strains representing all the known groups were coincidentally employed, and therefore it is reasonable to suppose that the serum will be active against the majority of the hemolytic streptococci found in human infections.

METHODS OF ADMINISTRATION

In the beginning it was thought advisable to dilute the serum with ten to one normal saline solution. We found that most cases had a very severe reaction and gradually we adopted a method of giving it direct by supplying it slowly at the start of the injection, the whole injection taking about twenty minutes. In most instances we gave 100 c.c. but in one or two cases only 50 c.c. were administered. Before injecting a case, the patient was tested for hypersensitiveness and an erythema extending under two centimeters was considered the limit for a negative test. In the course of our care of these patients we had several that were hypersensitive. It was necessary to desensitize one patient. This was done by the administration of small doses beginning with a drop and gradually increasing the amount to 1 c.c. through the course of about an hour. We were fearful of this procedure and one patient who seemed very sensitive to the skin test did not receive any serum and later died of the disease.

SERUM SICKNESS

A number of the patients developed serum sickness evidenced, as a rule, only after 48 hours. Large urticarial wheals appeared and

while the itching was always intense it could be temporarily relieved by small doses of adrenalin. One patient had, on completion of the injection, a moderate edema of the glottis and also an urticaria which made it necessary to remain with her for a time in order to be at hand in the event of a complete closure of the throat by edema. Another patient presented acute anaphylactic shock with considerable hemolysis. She became very anemic in appearance and the blood count showed a marked drop. This patient was in a critical condition for some hours. Her temperature finally subsided and she recovered. In some cases the serum rash did not appear for four days and in one patient not for eight days. Two women several days after the treatment had swollen and tender joints with pain and discomfort. Serum sickness is known to occur in about 70 per cent of the individuals who receive large doses of horse serum and approximately the same figure applied to our cases.

After our experience in the administration of a number of doses we have ceased to fear any serious effects from the administration of the serum as such, providing the precautions mentioned are observed.

DOSAGE

In most of our cases the serum was not given as early or as frequently as we now believe advisable and necessary. Our reasons for this were that we wished to be certain the rise in temperature was not a temporary affair and therefore we waited for the report from the intrauterine culture or for definite clinical evidence of a septicemia; and secondly we wished to produce results with the smallest possible amount of serum and so did not repeat the dose unless the temperature remained high; and finally in cases that had serum reaction we deemed it inadvisable to repeat the dose. We feel that such cases should be very carefully tested before further administration and we hesitate to continue the injections even if proper desensitization is done. Possibly further progress with the treatment will cause us to reconsider this point. As regards the administration every twelve hours—as is sometimes done with pneumococcal serum—our experience showed us that the reaction from the antistreptococcus serum was often so severe that its repetition within twenty-four hours seemed inadvisable. Most of our patients had an increase in temperature and pulse rate after the administration of the dose and many had a marked chill. This rise in temperature occurred rather with the first than with repeated injections. The explanation is not apparent unless one could consider that the serum had an actual bacteriolytic effect, a fact generally denied, or that it is merely a foreign protein reaction. It is better to give the serum at a time when the temperature is at its low point for the day. However, a continued high temperature is not a contraindication for the use of the serum.

INTRAUTERINE CULTURES AND BLOOD CULTURES

In taking intrauterine cultures we deviated slightly from the Doederlein method. The cervix was exposed by a speculum, grasped by a sponge forceps, wiped with 3.5 per cent iodine and then a cannula was inserted into the uterus. A much smaller tube with a suction bulb was then inserted through the cannula without touching its edges. When it had passed into the uterus the pressure on the bulb was released sucking the discharge into the second tube. This was then withdrawn through the first tube and the whole apparatus removed from the vagina. With this method we never failed to obtain a pure culture. All the blood cultures were negative. We feel certain that these cases were bacteremias and our failure to secure positive cultures may be explained by the fact that the bacteria are more readily found just before or immediately after a chill, and our cultures were taken at any time in the daily routine that might be convenient. While the clinical evidence was in favor of accepting these cases as true septicemias it may be possible that the high temperature and chills were due to the circulation of toxins from a local area of infection. Probably it is better to take repeated cultures, one or more each day, until the results are positive. Philip Williams in a personal communication assured me that he obtained his positive results in febrile cases by ordering the cultures in a row.

In the presence of a fever continuing through a second twenty-four hours we are strongly of the opinion that 100 c.c. of serum should be administered, after proper desensitization tests, and at the time that the blood and uterine cultures are taken. This is because, as was first stated by Marmorek, the serum may be valueless if the injections are made too late in the disease.

OTHER PROCEDURES IN THE TREATMENT OF PATIENTS

The infected cases were kept out on a balcony between two wards and both winter and spring were exposed to the outdoor temperature. Most of the beds were protected by window screens in arches of the balcony so that there was no direct draught. No local treatment was given. As we have more experience with this type of case we limit the number of examinations by vagina or rectum. We feel strongly that in those cases in which there is a small amount of exudate in the parametrium, walled off by a leucocytic barrier, a bimanual palpation may be sufficient to destroy the protective area. Following the injection of the serum and the dropping of the temperature there is usually some local exudate. It seemed to us that the serum had a definite tendency toward localizing the disease by the production of a parametritis.

(For discussion see page 727.)

(The detailed case reports and conclusions, together with temperature charts, will appear in the July issue.)

A PRELIMINARY REPORT OF A STATISTICAL STUDY OF PUERPERAL SEPSIS*

BY OTTO R. EICHEL, M.D., ALBANY, NEW YORK

(*Director, Division of Vital Statistics, New York State Department of Health.*)

IT is the purpose of this paper to discuss the general prevalence of the mortality from puerperal sepsis in New York City and the rest of New York State, including its geographical distribution, its relative occurrence in the practice of physicians and midwives, its seasonal variation, its frequency by ages of the mothers and their marital condition, and by associated causes of death. The statistical data presented are chiefly derived from an extensive analysis of the maternal mortality now in progress in our office, and such as are preliminary will be subject to slight modification in our final report.†

Unfortunately, there is not available reliable information on the prevalence of puerperal sepsis as an infectious disease because many physicians, both in New York City and elsewhere in this state, neglect to report their cases. This is self-evident from the fact that the number of deaths is usually in excess of the reported cases. Thus, during the three years, 1920-1922, there were reported in the entire State of New York 1,148 deaths, but only 877 cases. During the same period there were reported in New York City 535 cases and 497 deaths, or only 38 more cases than deaths. These figures require no comment. As a consequence of the failure to report sepsis, it is impossible to determine whether or not the prevalence of the infection and its fatality is increasing or diminishing. If one assumes that the fatality is always constant, namely that always the same percentage of those infected die, then, of course, the mortality is also an index to the trend of the morbidity. But even if this assumption were valid, it would still be impossible, without reliable case reports, to determine the prevalence of the infection with regard to its type, the associated illnesses, and many other important facts. Deaths, however, must be registered, and hence for some purposes official mortality statistics may safely be used.

For some years there has obtained in New York State a relatively high death rate from causes connected with childbirth. This rate, stated as the number of deaths from such causes in proportion to live births and stillbirths combined, the latter being the nearest possible denominator representing actual conceptions, has compared very un-

* Read by invitation before the New York Obstetrical Society, New York City, January 8, 1924.

†I take pleasure in acknowledging the valuable help of Miss Carolyn A. Boudo, Research Assistant in my office, in preparing much of the data necessary for this study.

favorably with other large areas for which similar maternal mortality statistics are available. During the seven years from 1915 to 1921, in the City of Birmingham, England, the rate from all puerperal causes combined was below 35 per 10,000 births and stillbirths combined, and in 1918 it was only 29; whereas, in New York City during the same period it ranged between 44 and 70; in New York State, outside of New York City, the rate varied in that period from 53 to 83. In fairness, it should be mentioned that Birmingham has one of the lowest rates of this kind of any large city in the world. In Stockholm during these seven years there have been rates as low as 28.

During the last five years, viz., 1918 through 1922, there occurred in the entire State of New York 7,000 deaths from all puerperal causes, of which 3,461 were reported from New York City and 3,539 from the rest of the state. Of the total number in the entire state, 1,910, or 27 per cent, were attributed to puerperal sepsis; in New York City, 852, or 24.6 per cent; and in the rest of the state, 1,058, or 30 per cent.

The trend of the death rate from all puerperal causes, this again being a rate based on live births and stillbirths combined, was definitely downward in New York City and in the rest of the state for six years following 1910. The New York City rate dropped from 56 in 1910 to 44 in 1917, and that for upstate dropped from 79 in 1910 to 53 in 1916. In both areas the rate rose to a sharp peak in 1918 owing to the influenza epidemic, reaching the point of 70 in New York City and 83 in the rest of the state. After 1918 the rate dropped sharply. It is a remarkable fact that there was no increase whatever in the rate for puerperal sepsis in 1918, thus showing plainly that the hazard of septic infection was not perceptibly increased by the influenza pandemic.

The sepsis rate declined in New York City from 19 per 10,000 live births and stillbirths combined in 1910 to 12 in 1921, and in the rest of the state from 28 in 1910 to 21 in 1921—the speed of decline was slightly more rapid in New York City and at a level about ten points lower throughout, and in no year has the upstate rate been as low as in the city. On the other hand, the rate from all puerperal causes, inclusive of sepsis, declined more rapidly upstate from 1910 to the influenza pandemic than in New York City. After 1918 this rate actually increased in New York City in 1920 and 1921, whereas it declined upstate. Although throughout all these years the upstate mortality from causes other than sepsis has also been at a much higher level than in New York City, these figures would seem to indicate that about the same progress has been made in both areas in the control of septic infection and that some-

what more rapid progress was made upstate in the care of conditions other than sepsis, and possibly also the upstate patients increasingly sought earlier medical care and were more frequently confined in hospitals.

The mortality from all puerperal causes, from septicemia alone, and from all other puerperal causes exclusive of septicemia, shows a very definite and regular seasonal variation in New York State. An analysis of a recent seven-year period (1914-1920) shows that September is the month of lowest mortality for both septicemia and all puerperal causes combined. There follows a regular increase in each month to a high point in winter with a subsequent decline during the spring and summer months to a low point in September. The septicemia peak occurs in March and that from other puerperal causes in February. This is attributed, I believe, to the greater prevalence of respiratory and renal diseases in the colder months; our studies have not progressed sufficiently to warrant a positive statement that this is true for New York State.

The average monthly New York State death rates from septicemia during the seven years, 1914-1920, were as follows: 12.6 per 10,000 live and stillbirths combined in September; 12.8 in October; 13 in November, and in the subsequent months 16, 18, 21, with the highest rate of 25 in March, and then 24, 23, 18, 13.5, 14, and finally again 12.6 in September. This shows a remarkable regularity in seasonal fluctuation.

An analysis of 6,821 deaths from causes connected with childbirth in New York State based on 1,242,374 live and stillbirths combined during the five years 1916-1920, which included for New York City 3,342 puerperal deaths and 711,482 live and stillbirths in that area, shows wide differences in their distribution. We are not prepared to offer any general explanation of these, and indeed there are no outstanding conditions to which they can be readily attributed. Most diverse variations may be observed, such as high mortality from septicemia and other puerperal causes in communities which differ greatly in social, racial, industrial and even climatic characteristics. An off-hand explanation usually offered by health officers and physicians to account for high rates in their communities is the presence of many nonresident deaths in hospitals. Close examination of the statistics, especially those published by our office in its special report on the "Geographical Distribution of Maternal Mortality in New York State" shows this explanation is not valid. In general, the lowest mortality from both septicemia and other puerperal causes is found in the large cities, and it is these which have the largest proportion of nonresident patients owing to their more extensive hospital facilities. The nonresident mother is usually confined in an institution. Doubtless for the very reasons that large cities have more hospitals, more

obstetric specialists, skilled midwives and nurses, and a high percentage of births in institutions, the average patient receives better care and hence these communities enjoy lower mortality rates in spite of their larger proportion of nonresident patients.

During the five-year period studied the number of deaths from puerperal septicemia in proportion to 10,000 live births and stillbirths was 14 in New York City as compared with 23 for all upstate cities combined, 21 in upstate villages of over 2500 population, and 16 in the rural area of the state. Thirty-four upstate cities had rates ranging from 20 to 64 per 10,000 live births and stillbirths as compared with a rate of 14 in New York City. Only 6 upstate cities had rates of 13 or less, and 5 had no sepsis deaths probably because they are situated very near to larger communities containing hospitals. Such large upstate cities as Buffalo, Rochester, Albany, Utica, Schenectady, Binghamton and Syracuse had septicemia rates of less than 30, whereas many of the smaller cities such as Oneonta, Newburg, Ogdensburg, Middletown, Olean, Plattsburg and Watertown had rates of over 40. The rural rate of New York State of 16 compares favorably with New York City's 14—possibly because many infected mothers are removed to city institutions, although this does not entirely explain the low rural rate. In this connection it must be recalled that rural areas in general in the United States, England, and other countries for which reliable statistics are available, have much lower death rates by age, and for many important causes, than do the urban districts—unquestionably because rural life and occupations in general are more healthful than urban and the people of higher vitality.

The septicemia rate of the rural area of New York State, distributed among the counties, shows a wide variation similar to that among the cities, the rates ranging from 0 to 63 per 10,000 live births and stillbirths.

The question had been raised as to whether septicemia mortality was limited in any significant degree to the practice of only a few physicians in those districts showing high rates. As this could be readily determined, we analyzed the distribution of sepsis deaths in 10 cities of this state having high rates to determine their prevalence in the practice of individual physicians. This study showed that they were not limited significantly to any one or even several physicians in any city, but on the contrary were freely distributed in the practice of many physicians. These men included the majority of physicians who attended obstetric patients and, therefore, were exclusive of specialists and aged or retired practitioners; e.g., in Troy during a recent five-year period there were 26 septicemia deaths distributed in the practice of 21 physicians, only one man having as

many as three. In all the cities reviewed, many physicians of high repute reported sepsis deaths.

The question then arose, and the direct statement has frequently been made by prominent physicians, that the midwife is chiefly responsible for septic infection. This also was susceptible of approximate determination by inquiry among the physicians who actually reported these deaths. During the 12 months preceding July 1, 1923, there were registered in upstate New York 205 deaths in which puerperal septicemia was the cause either alone or associated with other diseases or abnormal conditions.

There were received 138 replies satisfactory for the present purpose, which represents 67 per cent of the total sepsis deaths. Of these, only seven (or 5 per cent) had a midwife in attendance before a physician was called.

Not only is this 5 per cent negligibly small when compared with the total, but also in no case was it definitely clear that the midwife was responsible for the infection. The chief points, as stated by the physicians themselves in these seven cases are as follows:

1. The patient had two previous miscarriages, pelvic cellulitis, a pelvic abscess which had been drained, and was suffering from hyperthyroidism. The physician attributed her death from sepsis to her old pelvic cellulitis; he believes she had adequate medical care preceding and during confinement.

2. This patient might have been saved if treated earlier in a hospital.

3. The midwife is blamed, although the physician states that another physician was in attendance before he was called and after the midwife was discharged.

4. The midwife is not blamed, and the physician states that he knows of no circumstance under which the patient could have been saved.

5. Patient was delivered of twin male fetuses by a midwife and had no previous medical care she (the patient) believed it unnecessary. The septic infection began 18 days after confinement and while the patient was under care of a physician who replaced the midwife. The attendant at death believed she might have been saved with better postpartum care. He does not indicate that the midwife was responsible.

6. Patient submitted to a criminal abortion performed by an alleged midwife in New Jersey.

7. Patient was alleged to have been under the care of a midwife two days and removed to a hospital while in labor and with a prolapsed cord. Version was performed and a dead child delivered; patient subsequently died of septicemia. The physician does not directly blame the midwife for the death and believes patient should never have become pregnant.

Hence there were only four deaths from sepsis in which the physicians could entertain the question of the midwife's responsibility and of these four, one was due to criminal abortion performed by an alleged midwife in New Jersey. Also, the medical attendants were unable to give the names of the midwives, nor is it clear that they were legitimate practitioners of midwifery licensed by the state of New York City—they may have been neighbors or irregular practitioners—a circumstance which can be overcome only by education of the public

and by law enforcement. Even granting that in these three suspicious cases the midwives, who were legally licensed to practice, did infect their patients, the percentage would be 2.2 per cent of the total number of sepsis deaths, and in view of the fact that midwives attended 10,365 or 10 per cent of all the upstate births in 1922, it must be admitted that it cannot be regarded as any fact or worthy of mention in the causation of sepsis and that they have maintained a record, which so far as responsibility is concerned, speaks for itself. As to the deaths not tabulated for this purpose, in which criminal abortion was the cause, it may be said that it is the rare midwife, licensed by New York State, who performs abortions.

It would seem that the status of the midwife in this matter is deserving of clarification in view of the hostile attitude of many physicians toward her and the widespread opinion in the medical profession that she is largely responsible for the high mortality from puerperal causes. The actual facts in this State are entirely to the contrary and in the nature of the case would be so. On this point I can speak from personal knowledge, as the registration and supervision of midwives outside of New York City was, until a few years ago, one of the duties of my office. I have personally examined the credentials and records of nearly 500 midwives, more or less, who are licensed upstate, have personally interviewed many of them, met many in conference, and had special reports from our midwife inspector on each individual among them. In general, they are well trained, careful, clean, and conscientious. Many, if not the majority, obtained their obstetric training abroad at a time when it was superior to that obtained by the average American medical student and some have had a training possibly better than that obtained by any American student even today. In addition to this, there are three other reasons why the licensed New York State midwife will have a low fatality in her practice:

1. She attends only normal cases, quickly recognizes abnormal conditions and promptly calls a physician, who is usually a good obstetrician.
2. She is clean and interferes as little as possible with nature's own mechanism of delivery.
3. She endeavors to obey the state law and regulations, violation of which would subject her to both cancellation of her license and prosecution, either of which might befall her far more readily than it would the physician, who has the great prestige of his profession and public opinion to support him.

These statements are not meant to be an expression of opinion on the desirability of others than physicians practicing midwifery, but only to emphasize the true facts of a situation concerning which there is such widespread misunderstanding.

In 1898 Mr. T. A. Coughlin, the eminent New South Wales statistician, in a paper before the Royal Statistical Society presented one

of the first, if not the first, attempts to determine quantitatively on a large scale by sound statistical procedure the risk at confinement of mothers at different ages and in successive confinements, differentiating them by marital condition. His analysis, based on over 115,000 confinements and 813 deaths in his territory during the early 90's, showed that when the mortality was precisely measured by reduction to a rate of deaths of mothers at given ages to confinements at the same ages, the resulting distribution of rates made a very symmetrical "U" shaped curve. This approximated a parabola, having a high point for mothers under 20 years of age with rates increasing at each successive age above 20 to a very high point at over 40—for all puerperal causes combined. The preliminary results of a similar analysis we have made for 311,872 confinements and 1,996 deaths of mothers from all puerperal causes in New York State, outside of New York City, during the three years 1919-21, show a curve of distribution almost identical with that of New South Wales about 30 years ago. For mothers 15 to 19 years of age, the mortality was 53.1 per 10,000 confinements which drops to 45.4 at age 20 to 24 and then at each 5-year interval thereafter up to 50 years of age and over it increases as follows: 55.5, 74.5, 89.8, 119.5, 144.1, and 222.2. This curve also characterizes the general distribution, by ages of the mothers, of the stillbirth mortality and of each group of important puerperal causes, including septicemia, with rates which differ, of course, for each such group.

Of the 1,996 deaths from all puerperal causes 650, or 32.6 per cent, were due to septicemia. Reducing these to a ratio per 10,000 confinements at each successive age from 15 to 50, we obtain the following distribution: from 15 to 19 years of age 20.0 per 10,000, which drops to 18.4 at age 20 to 24, and then increases in each 5-year age group to 45-49 years as follows: 18.8, 22.8, 25.1, 28.5, and 32.0, thus showing a steady increase of the risk of death from septicemia at each age above 20.

Separating the septicemia mortality of the married mothers from that for the unmarried, we find the slight peak at under 20 years of age disappears, and the rates at each age increase progressively from 15 up to 45 years of age, with a slight drop at 45 to 49, which has no significance owing to chance error because of small numbers involved; the rates are as follows: at age 15 to 19, 13.5 per 10,000 confinements of married mothers, and at each 5-year age period thereafter: 16.4, 18.5, 21.7, 24.9 and 27.8. We are not justified at present in exhibiting rates for the unmarried mothers by age, as the number of deaths when thus distributed become too small to give the rates any significance,—they are subject to wide fluctuations as a matter of chance.

There were 603 deaths from septicemia among married mothers out

of 308,176 confinements, thus showing a death rate of 19.6 per 10,000 as compared with a rate of 129.3 for unmarried mothers, among whom there occurred 3,481 confinements and 45 deaths from septicemia. Thus, the total mortality from septicemia among unmarried women was over six and one-half times higher than among the married. The legitimate stillbirths comprise 3.3 per cent as compared with 6 per cent illegitimate stillbirths.

The preliminary results of a study we are making of maternal mortality show that out of 2,933 deaths from all puerperal causes during the four years 1919-22 in New York State, outside of New York City, there occurred 888 deaths or 30 per cent in which septicemia was a cause of death either alone or associated with one or more other causes. It occurred as the sole cause of death in 271 cases or 30.5 per cent of all the sepsis deaths, and was associated with one or more other causes in 617 or 69 per cent of the total.

At the present stage of our study we are able to give the following preliminary data on associated causes in 477 out of the latter 617 deaths, which 477 comprise 77 per cent of all sepsis deaths which occurred in combination with other diseases, affording therefore a good sample:

		%
Abortion, miscarriage, premature birth; <i>total</i>	299	62.7
Criminal and self-induced abortion	(82)	17.2
Toxemias of pregnancy; <i>total</i>	16	3.4
Miscellaneous diseases of pregnancy; <i>total</i>	26	5.5
Ectopic gestation	(16)	3.4
Acute infectious diseases occurring during pregnancy (typhoid, influenza, pneumonia, etc.)	22	4.6
Chronic infectious diseases (tuberculosis, syphilis, etc.)	4	0.8
Diseases of circulatory and respiratory systems	4	0.8
Diseases of kidneys and urinary tract	5	1.0
Diseases of the nervous system	1	0.2
Diseases of the generative tract	14	2.9
Septic infection of hand	1	0.2
Surgical operations during pregnancy	6	1.3
Traumatisms	2	0.4
Morphinism	1	0.2
Puerperal hemorrhage; <i>total</i>	9	1.9
Placenta previa	(8)	1.7
Dystocia	13	2.7
Obstetric operations; <i>total</i>	34	7.1
Cesarean section	(22)	4.6
Version	1	0.2
Forceps	9	...
Operation, not specified	2	0.4
Injuries during delivery	6	1.3
Rupture of uterus during labor	5	1.0
Retained placenta or membranes	7	1.5
Acute infectious diseases occurring during puerperium	2	0.4
Total	477	100.0

As stated above, there were registered officially between July 1, 1922, and June 30, 1923, 205 deaths from puerperal sepsis. Inquiries were made of each reporting physician to determine the circumstances under which the infection occurred. Replies satisfactory for this tabulation were received for 148 or 72 per cent of these sepsis deaths. From a careful study of the replies the following facts emerge:

1. Twenty-nine, or 20 per cent, resulted from self-induced or criminal abortion or miscarriage, in five of which the patient was neglected or given poor care and in addition two had other serious illness at the time of infection.

2. Five, or 3.4 per cent, followed abortions or miscarriages which were spontaneous or accidental with the cause of infection apparently unknown in four. In one of these cases the physician said he was called too late, one followed a hysterectomy and salpingectomy, and in two, other serious illness existed at the time of infection.

3. Twenty-one, or 14 per cent, followed abortions or miscarriages from unknown or unspecified causes. Nine of these patients had been neglected or given poor care previous, during, or after the abortion, and three suffered at the same time from some other illness.

4. Twenty-six infections, or 17.6 per cent, followed causes unknown or unspecified. Six of these patients had been neglected or given poor care and seven were suffering from other serious illness at the time of infection.

5. Three, or two per cent, were reported as having infected themselves after delivery, owing to carelessness, ignorance, neglect, or accident.

6. Twenty infections, or 13.5 per cent, followed interference or obstetrical operations, some for serious abnormal conditions. Five had been neglected or given poor care at some time preceding or during attempts at delivery. One case was doubtful as to manual interference.

7. Eighteen additional infections, or 12 per cent, followed interference or obstetrical operations for abnormal conditions in patients who also had other serious illness previous to, during, or immediately after confinement. Four of these patients had been neglected or given poor care at some time previous to infection and one, having organic heart disease, underwent forceps delivery and 10 days later appendectomy.

8. Thirteen, or 8.8 per cent, had no abnormal or puerperal conditions, but were suffering from other serious illness. Seven of these had been neglected or given poor care some time previous to infection and one underwent hysterectomy, and double salpingectomy for gonorrhea.

9. Ten, or 6.8 per cent, were apparently blamed indirectly upon some other physician in previous attendance. Seven of these patients had been given poor care or neglected at some time before infection. One had some serious illness other than puerperal and one underwent an obstetric operation.

10. Two, or 1.4 per cent, were indirectly blamed upon a midwife, although one of these patients had been neglected and one underwent an obstetric operation.

11. One (or less than 1 per cent) was blamed upon a nurse.

These facts may be summarized as follows:

1. Twenty-nine, or 20 per cent, followed self-induced or criminal abortion or miscarriage.

2. Twenty-one, or 14.2 per cent, followed abortion, miscarriage, or unspecified causes, some of which may have been criminal or self-induced.

3. Obstetric operations, such as version, cesarean, forceps, etc., were performed in thirty-eight, or 25.7 per cent.

4. Forty-five, or 30 per cent, of the patients had been neglected or given poor care previous to infection, many of them being abnormal cases requiring interference, and some, in addition, suffering from other serious illnesses.

These facts seem to warrant the following conclusions:

I. Inasmuch as exactly one-half of the infections followed abortion or miscarriage, either self-induced or criminal, or from unknown or unspecified causes, the remedies would seem to be as follows:

- (a) Education of the public as to the grave dangers of abortion, criminal or other.
- (b) The suppression of the criminal abortionist.
- (c) Prompt and competent care, with adequate facilities therefor, of the patient suffering from accidental or spontaneous abortion.

II. As 45, or one-third, had been neglected or given poor attention at some time previous to infection, the remedies are probably:

- (a) Education of the public as to the hazards of abnormal conditions connected with pregnancy and the need for competent care from the beginning of conception.
- (b) Adequate clinical and hospital facilities for the care of the poor and those of moderate means.
- (c) Elevation of the standards of obstetric training and practice for physicians, inasmuch as there is ample ground to suspect that in many cases delay or incompetency on the part of the first physician called began a chain of events ending in sepsis and death.

III. Inasmuch as 38, or one-fourth of the deaths followed obstetric operations or interference and as 18 of these 38 patients also suffered from serious illness other than the puerperal condition, it is clear that extreme aseptic precautions are essential if an interference or operation is necessary, particularly if the patient is suffering at the same time from a serious illness not connected with the puerperal condition.

IV. In twenty-six cases, or 17.6 per cent, there was no clue to the possible origin of the infection, except that 6 of the patients had been neglected or given poor care, and 7 suffered from some other serious illness. In several cases the physicians stated they had no explanation, as their patients had apparently received the best possible care from conception. These facts, with the demonstrated seasonal variation, would seem to warrant these conclusions:

(a) That even under excellent conditions and control, accidental and fatal infections will occur; these may be regarded as an irreducible minimum, due to the hazards of low resistance, accidents, and human fallibility.

(b) The clinical, pathological, and statistical research may discover facts at present unknown concerning the modes and routes of puerperal infection.

(c) That every case should, during delivery and the puerperium, be treated with the same thorough aseptic precautions as are observed in major surgical operations.

(For discussion see page 724.)

THE CONSERVATIVE TREATMENT OF ECLAMPSIA*

BY ALFRED C. BECK, M.D., BROOKLYN, N. Y.

INFORMATION of a positive nature concerning eclampsia is most meager. One therefore hesitates to form a definite opinion as to treatment. Since eclampsia occurs only in women who are pregnant or who, recently, have been pregnant, we may assume that the products of conception are factors in the etiology. If this is true, interruption of pregnancy should prove beneficial. Up to six years ago, immediate delivery was our first consideration. To accomplish this we resorted to cesarean section, vaginal hysterotomy, incisions of the cervix, forceps, and version and extraction. Our results compared most unfavorably with those of Tweedy, Stroganoff and others whose routines were more conservative. Accordingly we felt that, in spite of our belief, we should give their methods a trial in our clinic.

For the past six years, all eclamptics admitted to the general service of The Long Island College Hospital have been treated in a conservative manner. While our routine has varied considerably during this period, we have consistently refrained from interfering with the pregnancy. In no instance was pregnancy interrupted, neither was any effort made to hasten labor, except for an obstetric indication other than eclampsia. In general we have aimed to increase elimination, to lessen the irritability of the nervous system, and to protect the patient from all external stimuli.

ELIMINATIVE MEASURES

In the early part of this work, the measures used to favor elimination were castor oil or magnesium sulphate administered through a stomach tube after gastric lavage, frequent colonic irrigations and an electric oven to promote sweating. Phlebotomy was employed as a last resort procedure usually after the onset of edema of the lungs.

More recently, as a result of the work of Liechtenstein, we have relied upon an early large phlebotomy as the best means of increasing elimination. We now withdraw 1000 c.c. of blood through a paraffin coated needle immediately after the first convulsion that occurs in the hospital. During the phlebotomy the blood pressure and pulse are constantly observed. If the blood pressure falls to 100 or the pulse rapidly changes, the phlebotomy is discontinued. Otherwise the full 1000 c.c. are withdrawn. The results following this change in our routine have been so striking that we now limit the use of the other

*Read at a meeting of the Obstetric Section, New York Academy of Medicine, December, 28, 1923.

TABLE I
THIRTY-EIGHT CASES OF ECLAMPSIA CONSERVATIVELY TREATED

NUMBER	HOSPITAL NUMBER	AGE	PREVIOUS PREGNANCIES	CONVULSIONS			MORPHINE	HOURS	PHLEBOTOMY	LABOR	RESULT		MORPHINE	HOURS
				ANTEPARTUM	INTRAPARTUM	POSTPARTUM	TOTAL				MOTHER	CHILD		
1	1918	24	0	0	0	0	0	5	0	Low forceps	Lived	Lived	1½ gr.	5
2	1964	24	0	0	0	0	0	42	480-c.c. early	Spontaneous	Lived	Died	2½ gr.	36
3	1242	22	0	0	0	0	0	16	300-c.c. early	Spontaneous	Lived	Died	3 gr.	16
4	4488	22	0	0	0	0	0	5	0	Low forceps	Lived	Lived	1½ gr.	5
5	5896	21	0	0	0	0	0	4	0	Low forceps	Lived	Lived	½ gr.	4
6	6062	20	0	0	0	0	0	8	0	Postpartum	Lived	.....	..	..
7	6069	20	0	0	0	0	0	5	0	Low forceps	Died	Died	1½ gr.	5
8	721	22	0	0	0	0	0	3	0	Induced-spont. delivery	Lived	Lived	0	0
9	1102	19	1	0	0	0	0	16	0	Ind. 6 days after rec-spont. delivery	Lived	Lived	4½ gr.	16
10	3078	22	4	0	0	0	0	4	0	Spontaneous	Lived	Died	1½ gr.	4
11	3489	21	0	0	0	0	0	11	0	Breech extraction	Lived	Died	..	..
12	3509	21	0	0	0	0	0	22	0	Not delivered	Died	.....	..	..
13	3656	21	0	0	0	0	0	24	300-c.c. early	Spont. 36 hr. after recovery	Lived	Died	3½ gr.	24
14	3374	20	0	0	0	0	0	12	600-c.c. late	Low forceps	Died	Lived	2 gr.	8
15	3630	22	0	0	0	0	0	10	0	Spontaneous	Lived	Died	2 gr.	10
16	1920	19	0	0	0	0	0	20	400-c.c. early	Spontaneous	Lived	Died	3½ gr.	20
17	2239	31	0	0	0	0	0	5	0	Postpartum	Died	.....	..	..
18	3317	40	8	0	0	0	0	10	0	Spontaneous	Lived	Lived	1½ gr.	10
	4461	..	0	0	0	0	0	10	0	Spontaneous	Lived	Lived	1½ gr.	10
	5007	..	0	0	0	0	0	10	0	Spontaneous	Lived	Lived	1½ gr.	10

1921	19	20	20	0	0	7	7	2½ gr.	8	600-c.c. late	Not delivered	Died	.....	..	..
1703	20	33	33	0	0	9	9	3 gr.	13	500-c.c. early	Spontaneous	Lived	Lived	3 gr.	13
2231	21	32	32	4	0	0	4	3½ gr.	17	0	Spontaneous	Lived	Died	3½ gr.	17
3337	22	20	20	0	3+	·	3+	2½ gr.	8	400-c.c. early	Not delivered	Died	.....	..	8
3440	23	26	26	1	0	5	5	2 gr.	8	500-c.c. early	Spontaneous	Lived	Lived	2 gr.	8
3685	24	19	19	0	0	0	8	2 gr.	8	540-c.c. early	Postpartum	Lived	.....	..	..
1922	25	29	29	0	3	0	3	1½ gr.	6	0	Vag. hysterot. 4 days after rec.	Lived	Lived	1½ gr.	6
3168	26	40	40	2	0	0	3	2 gr.	8	500-c.c. early	Postpartum	Lived	Lived	..	..
3511	27	37	37	13	0	0	3	1½ gr.	10	400-c.c. early	Postpartum	Lived	.....	..	..
4130	28	30	30	1	0	1	2	2½ gr.	12	800-c.c. early	Induced-spont. delivery	Lived	Lived	½ gr.	1
5006	29	32	32	5	0	1	1	½ gr.	2	950-c.c. early	Induced-spont. delivery	Lived	Lived	½ gr.	2
5735	30	18	18	0	0	5	5	1½ gr.	5	0	Cesarean section	Lived	Died	0	0
1923	31	26	26	0	2	·	2	½ gr.	5	0	Not delivered	Lived	Lived	½ gr.	5
52	32	36	36	0	0	3	3	1½ gr.	16	1000-c.c. early	Low forceps	Lived	Died	1½ gr.	16
92	33	40	40	0	0	0	1	½ gr.	11	0	Cesarean section	Lived	Lived	0	0
343	34	42	42	10	0	0	1	1½ gr.	19	450-c.c. early	Postpartum	Lived	.....	..	..
323	35	43	43	0	0	0	2	1 gr.	4	800-c.c. early	Postpartum	Lived	Lived	..	..
397	36	26	26	2	0	0	1	1 gr.	3	1000-c.c. early	Postpartum	Lived	.....	..	..
432	37	26	26	1	0	3	3	1½ gr.	6	1000-c.c. early	Spontaneous	Lived	Died	½ gr.	4
452	38	30	30	0	0	0	3	1 gr.	3	560-c.c. late	Postpartum	Died	.....	..	..

eliminative measures. Gastric lavage no longer is employed and colonic irrigations are given but once in twenty-four hours.

SEDATIVE MEASURES

To lessen the irritability of the nervous system morphine has been used exclusively. One-half grain of this drug is given immediately after the patient's admission to the hospital. It is repeated in one-fourth grain doses at intervals of one hour until the convulsions cease, or the respirations are markedly lowered. The effect of morphine on the fetus is not considered, as frequently a living child is born even after an enormous amount of the drug has been given. In one instance four and one-fourth grains were given during a period of sixteen hours without any harmful effect on the mother or child. Since we have been using the large early phlebotomy the amount of morphine required has been greatly diminished.

PROTECTION OF THE PATIENT

We have endeavored to protect our patients from external stimuli by placing them in a darkened room that is kept as quiet as possible. In addition, we avoid the use of all measures that are not absolutely necessary. In over half of the cases in which a stomach tube was passed this procedure caused a convulsion. Accordingly, gastric lavage has been eliminated from our routine. The insertion of a rectal tube likewise was occasionally responsible for a convulsion. As a result colonic irrigations are now given once in twenty-four hours instead of every six hours. In doing a phlebotomy we withdraw the blood through a large bore paraffin coated needle and thus avoid the disturbance which cutting down on a vein causes. As before stated phlebotomy is done immediately after a convulsion while the patient is in coma. Whenever possible hypodermics and other treatments are given during the coma that follows a convulsion. Frequent blood pressure determinations and catheterizations have been abandoned as we have found that they unnecessarily disturb the patient. In general we try to protect all eclamptics from external stimuli, just as is the custom in the treatment of tetanus, strychnine poisoning and hydrophobia.

Thirty-eight patients suffering from eclampsia have been treated according to this routine during the past six years (Table I). In three instances labor was induced (Cases 8, 28 and 29). These inductions, however, were done before the onset of convulsions. It is our custom to use eliminative measures with rest in bed in preeclamptic toxemia. If improvement is not observed after such treatment, labor is induced in the hope that the interruption of pregnancy may prevent the occurrence of eclampsia. While it is possible that the induction of labor in these three cases might have furnished the external stimulus that

caused the convulsions, we feel that we have prevented eclampsia in too many preclampsie toxemias by similar treatment to discontinue the use of induction in such cases. After convulsions have occurred the conditions are quite different. The patient is then a poor risk for any operation. Because of this fact the pregnancy itself was disregarded until the patients improved sufficiently to stand the risk of interference. Case 9 is an illustration of this practice. Here labor was induced six days after recovery. As a rule most eclamptics go into labor spontaneously in the course of the disease or soon after recovery. If labor does not begin spontaneously within a reasonably short time after recovery we resort to induction, as we have observed a recurrence of eclampsia in the same pregnancy in two cases. In one of these, convulsions returned three weeks after recovery and the other had her second attack thirteen days after the first.

TABLE II
RESULTS IN THIRTY-EIGHT CASES CONSERVATIVELY TREATED

	TOTAL	DEATHS	
Morphine only	16	3	18.7%
Morphine—Late phlebotomy	3	3	100. %
Morphine—Early phlebotomy	17	1	5.9%
Morphine—Cesarean section	2	0	0 %
	<u>38</u>	<u>7</u>	18.4%

Low forceps were used five times either because of fetal asphyxia or a prolonged second stage. (Cases 1, 4, 5, 7, and 32.) Breech extraction was done for the same reason in Case 11. Two cesarean sections are included in this series. In Case 29 the patient had a contracted pelvis and a low cesarean section was done after a full test of labor. The other, (case 33), was a primipara forty years of age. Here the operation was elective and of the classical type and was done in order that we might be certain of a living child.

While our routine as regards the conservative treatment of the pregnancies in these thirty-eight cases has been consistent, in other respects it has varied sufficiently to warrant a classification of the series into three groups. In the first group are included the cases that had morphine but no phlebotomy. Chart 1 is an illustration of this routine. Four and one-quarter grains of morphine were given during a period of sixteen hours. The mother recovered and later gave birth to a living child. The second group differs from the first in one respect only. A phlebotomy was done late in the course of the disease as a last resort measure. My reason for isolating these cases from the first group is that some men may feel that the phlebotomy done at this time might have been responsible for the fatalities that occurred. (Chart 2.) Here morphine was given in the usual manner and when the patient de-

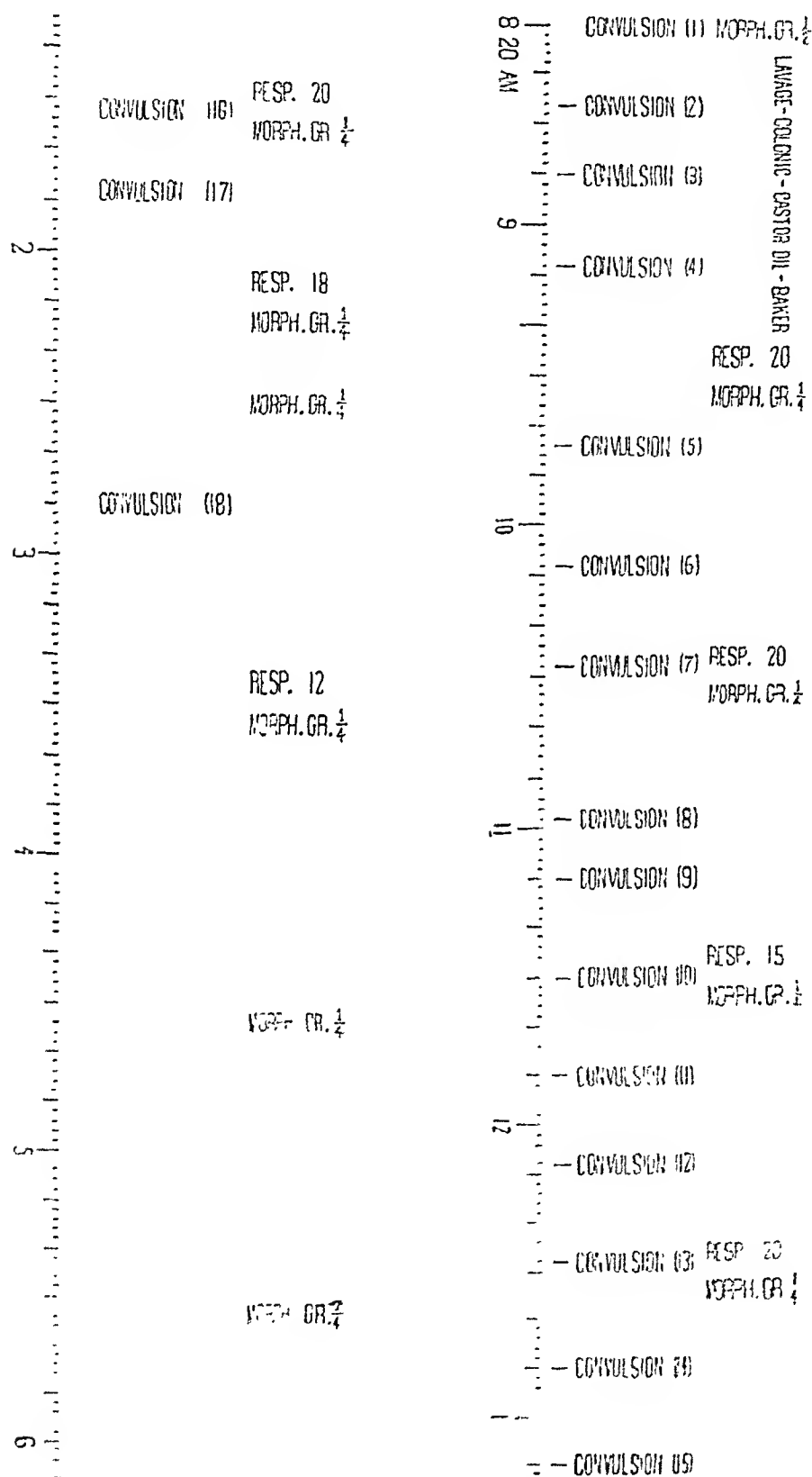
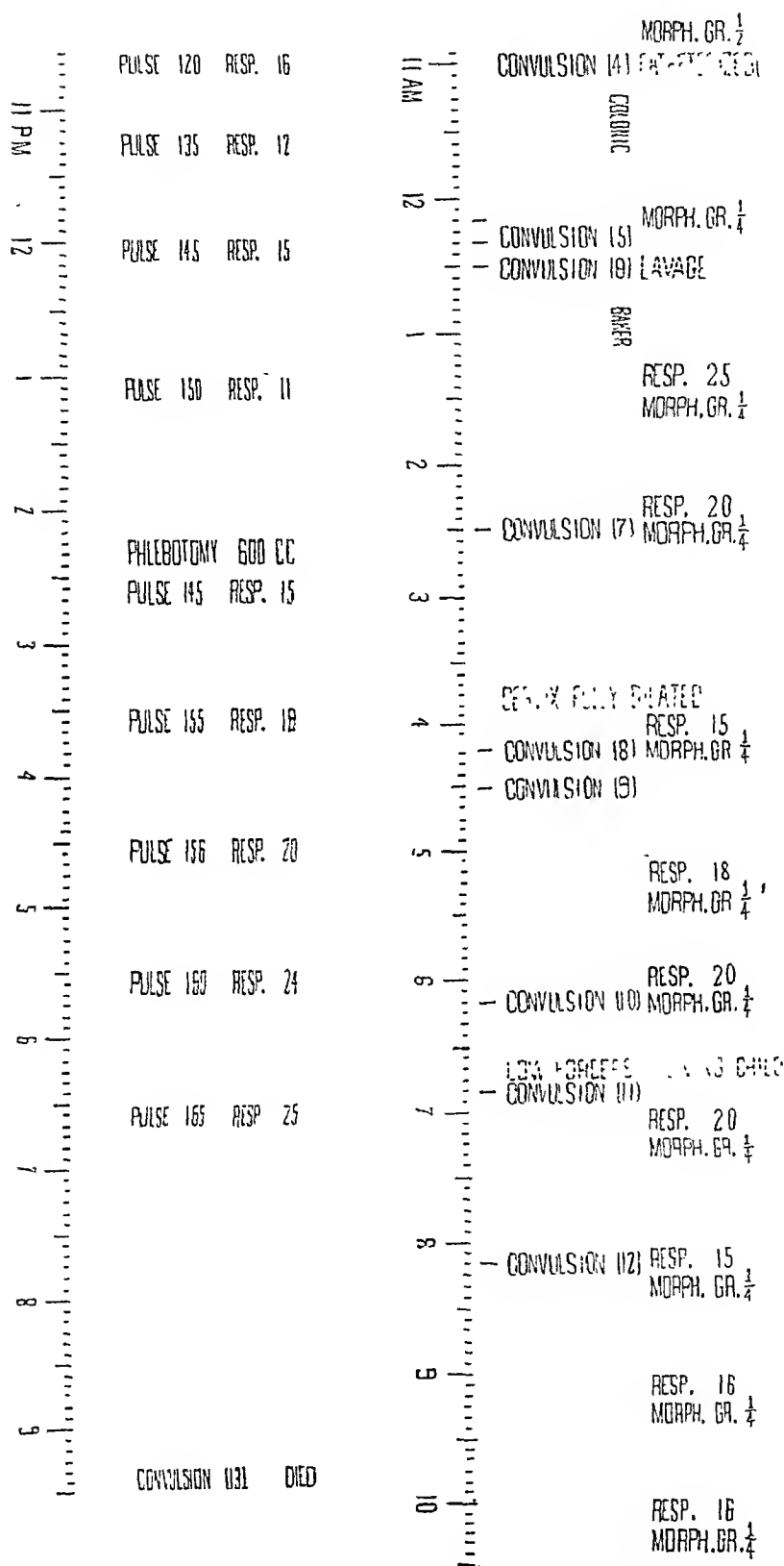


Chart 1.—Morphine without phlebotomy.



M.R. NO. 5430-1919-13 CONVULSIONS- LATE PHLEBOTOMY- MORPH. GR. 3- MOTHER DIED- CHILD LIVED

Chart 2.—Morphine with late phlebotomy.

veloped edema of the lungs, 600 c.c. of blood were withdrawn. The third group consists of those cases in which an early large phlebotomy was done and morphine was administered as above outlined. (Chart 3.) This is the routine which we have learned to regard as the preferable one. If the phlebotomy is done early and a sufficiently large amount of blood is withdrawn improvement soon follows and the need for morphine is thereby so diminished that the total amount of this drug required is relatively small. The results in each of these groups are given in Table II. While the series of seventeen cases included in the

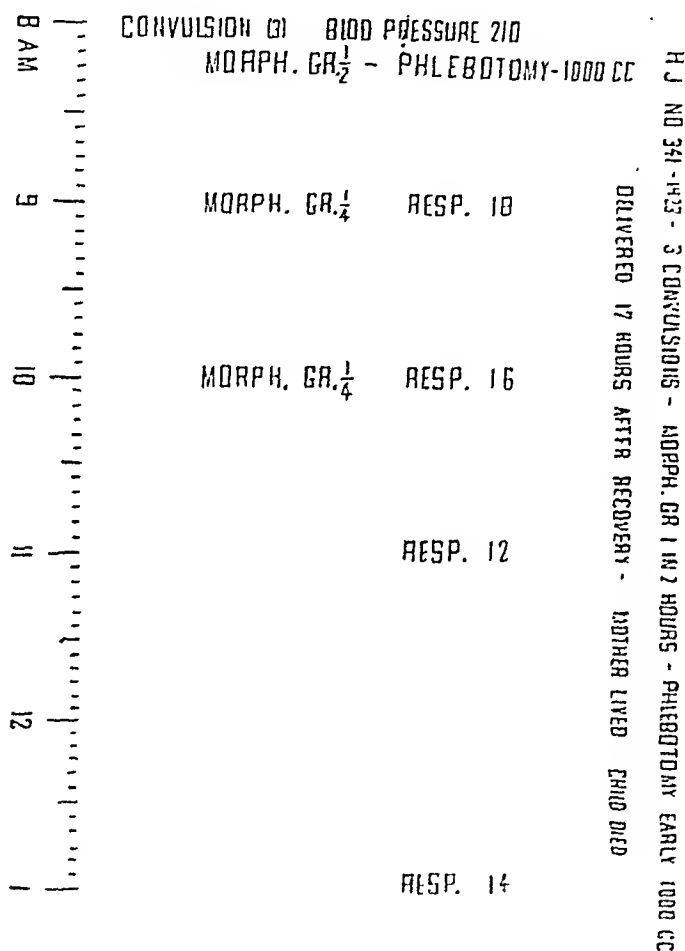


Chart 3.—Morphine with early phlebotomy.

morphine and early phlebotomy group is small and does not justify our drawing any definite conclusions concerning this method of treatment, the mortality is the lowest that we have ever been able to obtain in even this small a number of cases.

As a control I reviewed the records of all the eclampsias that have been admitted to our institution during the past ten years. Table III shows the results in the 64 cases that made up this series. As may be observed our mortality for the ten-year period was 21.8 per cent. In our hands the conservative routine has been followed by better results than were obtained when we interfered with the

TABLE III

ECLAMPSIAS TREATED DURING THE PAST TEN YEARS AT THE LONG ISLAND COLLEGE HOSPITAL

RESULTS IN 64 CASES

	TOTAL	DEATHS	%
Antepartum cases	17	2	11.7
Intrapartum cases	31	7	22.5
Postpartum cases	16	5	31.2
Total cases	64	14	21.8

TABLE IV

INTERFERENCE AND NONINTERFERENCE IN THE TREATMENT OF ECLAMPSIA CONTRASTED
RESULTS IN 48 ANTEPARTUM AND INTRAPARTUM CASES

18 <i>Pregnancies Interrupted</i>			
LABOR	TOTAL	MATERNAL DEATHS	INFANT DEATHS
Cesarean section	8	3	2
Vaginal hysterotomy	7	0	4
Bag-forceps	1	0	0
Incision of cervix-forceps	1	1	1
Bag-manual dil.-version-ext.	1	0	1
Total	18	—	8 = 44.4%
30 <i>Pregnancies not Interrupted</i>			
LABOR	TOTAL	MATERNAL DEATHS	INFANT DEATHS
Spontaneous	17	0	9
Low forceps	7	2	2
Breech extraction	1	0	1
Not delivered	5	3	3
Total	30	5 = 16.6%	15 = 50%

pregnancy. This is clearly shown in Table IV which includes all of the antepartum and intrapartum eclampsias. In the eighteen cases where the conservative plan was not followed the mortality was 22.2 per cent, while in the 30 conservatively treated, it was 16.6 per cent.

CONCLUSIONS

1. In preeclamptic toxemia labor should be induced if no improvement follows the use of eliminative measures.

2. After the onset of convulsions better results have been obtained in our clinic by ignoring the pregnancy until the patient has sufficiently improved to stand the risk of interference.

3. Early large phlebotomy together with the morphine routine has given us the best results that we have ever obtained in the treatment of eclampsia. ✓

4. We believe that labor should be induced several days after the patient recovers from eclampsia in order that a second attack may be avoided.

I wish to acknowledge my thanks to Dr. Polak and to my associates at The Long Island College Hospital for the use of their records and their help in this study.

A STATISTICAL REVIEW OF THE TOXEMIAS OF PREGNANCY*

BY E. EVERETT BUNZEL, M.D., NEW YORK, N. Y.

(From the Sloane Hospital for Women, Dr. Wm. E. Studdiford, Director.)

A GREAT many theories and a vast amount of discussion have arisen concerning the etiology of the toxemias of pregnancy. At Sloane Hospital we have interested ourselves not so much with any special theory as to the etiology of this complication of pregnancy, but with open minds to see if any conclusion could be drawn from a study of a series of such cases. By the term "Pregnancy with Toxemia" we mean, in brief, a complication of pregnancy manifested by headache, disturbances of vision, edema, hypertension, and albuminuria, either with or without convulsions.

This series covers a period of four and a quarter years from July 1, 1919, to October 1, 1923, and is collected from 7384 consecutive deliveries. There was a total of 465 cases of pregnancy with toxemia, producing an incidence of 6.3 per cent. This series includes all the toxic cases delivered in the hospital as follows: private cases, 89 or 19 per cent; antepartum clinic cases, 214 or 46 per cent; emergency cases, 162 or 35 per cent.

The private and antepartum clinic cases aggregate 65 per cent of the total, because it has been our custom to admit patients to the Hospital when any of the signs or symptoms mentioned appear acutely or progressively increase. It is because of this safeguard that we find as many as 107 cases of mild toxemia in this group. We have divided pregnancy with toxemia into four classes: (1) mild, (2) moderate, (3) severe, and (4) with convulsions. It must be understood that no very definite lines of demarcation may be drawn, separating cases into any one of the first three subdivisions, although any case with convulsions, be it ante-, intra-, or postpartum, falls immediately into subdivision (4). A certain case is placed into one of the first three classes, not because of any one sign or symptom, but because of the composite picture. Roughly, however, we arbitrarily consider those cases as "mild" in which the systolic blood pressure does not exceed 145, in which the edema is slight, and in which the albuminuria is not greater than 10 per cent by gravity of the 24-hour specimen. We classify those cases as "moderate" in which the systolic blood pressure ranges between 145 and 165, in which there is pitting edema, and in which the albuminuria is between 10 and 20 per cent. That leaves us, therefore, the "severe" group in which the systolic blood pressure is above

*Read at a meeting of the Section on Obstetrics and Gynecology of the New York Academy of Medicine, December 27, 1923.

165, the edema is massive, and the albuminuria is more than 20 per cent. According to this classification, therefore, we have in our series: mild toxemia, 107 cases, or 23 per cent; moderate toxemia, 163 cases, or 35 per cent; severe toxemia, 141 cases, or 31 per cent; toxemia with convulsions, 54 cases, or 11 per cent.

In this series 60 per cent were primiparae and 40 per cent multiparae, and it is interesting to note the increasing number of patients admitted to the Hospital as pregnancy advanced: three cases were admitted in the 2nd month; five cases in the 3rd month; six cases in the 4th month; 14 cases in the 5th month; 34 cases in the 6th month; 71 cases in the 7th month; 161 cases in the 8th month, and 171 cases in the 9th month of pregnancy.

Many of these cases were admitted and kept under observation and treatment for long periods, 173 patients having been in the Hospital from one to seven weeks antepartum, and of these 26 were admitted two or more times during their pregnancies when the signs or symptoms recurred. Of course, in such cases the patient is instructed to report at frequent intervals to the antepartum clinic, for only when the patient will cooperate and report to the clinic regularly can such treatment be successfully carried out. To illustrate, the following case histories are given:

No. 44927 (old system): emergency admission, age twenty-eight, gravida ii, admitted with headache, disturbance of vision, edema, blood pressure 192/100, albuminuria 85 per cent, about seven and one-half months pregnant. She was given morphine, bromide and chloral per rectum, colonic irrigations and electric blanket hot packs. She responded well to the treatment and was kept in the Hospital 31 days before she went into spontaneous labor and delivered a living child. Upon discharge from Sloane her blood pressure was 130/90 and the albumin only a faint trace.

No. 2971 (new system): clinic patient, aged thirty-seven, four previous pregnancies, three of which had terminated in spontaneous abortions, the fourth having been induced at 6 months because of toxemia without convulsions. During the present pregnancy she was first admitted to the Hospital when about 14 weeks pregnant with a blood pressure of 168/88 and a faint trace of albumin. She responded to treatment and because of the keen desire of both the patient and her husband to have a baby, the pregnancy was allowed to continue. She made 19 visits to the antepartum clinic and was readmitted to the Hospital ten days before term. Cesarean section and sterilization were done because of the pelvis and the advisability of no further pregnancies. The baby and mother left the Hospital in good condition.

In this review we are not discussing the methods of treatment, but it will not be amiss to mention briefly the usual treatment of these cases at Sloane. All toxic cases when admitted to the Hospital are put to bed, a routine urinalysis of the 24 hour specimen is done daily, the systolic and diastolic blood pressures are recorded every morning, the patient is placed on a low protein salt-free diet, and the bowels kept open by catharsis. There is a standing order for

a blood chemistry examination, the blood being taken on a fasting stomach the morning after admission. These are the standing orders for all toxic cases, but those which fall into subdivision 2, 3 and 4 receive additional treatments as the symptoms indicate, such as colonic irrigations, hot packs with an electric blanket, sodium bromide and chloral hydrate per rectum, morphine hypodermatically, lavage, phlebotomy, and for the convulsive cases we frequently use paraldehyde intravenously. Many of the cases on physical examination are found to have very bad dental conditions which are corrected at once. In caring for these toxic patients, each case is individualized and the treatment varies accordingly, and only after a fair trial under treatment without improvement is labor induced. We emphasize this point, because all too frequently in the past patients have been rushed into an operating room soon after admission and attempts at induction made when the patient's condition was at its worst. This mistake has often been made with the worst possible results as the following cases will illustrate.

No. 44010 (old system): emergency admission, had not attended antepartum clinic; gravida iv, admitted in stupor with the history of having had at least one convulsion before being brought to Sloane. On admission the blood pressure was 255/120, the urine showed 90 per cent albumin, there was massive edema, and the eye grounds showed albuminuric-neuroretinitis and hemorrhages. The case was bagged soon after admission, given a dose of morphine and delivered of a live premature child. The patient had 4 convulsions before and during labor, and 6 convulsions postpartum. She went into coma and died 15 hours after delivery.

No. 42220 (old system): emergency case, admitted complaining of headache, disturbances of vision, edema, blood pressure 230/112, albumin 90 per cent; period of gestation about five and one-half months. Morphine was given and then a bag was introduced, and because no effect was obtained upon the cervix, a vaginal hysterotomy was done the day of admission. The patient's condition grew worse and she died ten and one-half hours after delivery.

These cases have been cited to show what we now consider bad management, because we have since seen many cases brought into the Hospital with very high blood pressure, massive edema and urines which have boiled almost solid, placed under intensive treatment and carried safely through without any operative interference. The following cases are examples:

No. 719 (new system): emergency, thirty-two years of age, gravida v, period of gestation eight and one-half months, admitted complaining of severe headache, blood pressure 260/180, albuminuria 90 per cent. The eye grounds showed edema of the discs, albuminuric-neuroretinitis and hemorrhages, and there were petechial spots scattered over the body. This patient was given repeated doses of morphine until the respirations were depressed, and bromides with chloral were administered by rectum. Fluids, without milk, were given abundantly and, on the second day of this treatment, the patient went into spontaneous labor and was delivered of a normal child. Upon discharge the mother's blood pressure was 110/76 and the urine contained only a trace of albumin.

No. 42442 (old system): emergency admission, aged twenty-five, gravida i, admitted in coma, with massive edema, blood pressure 275/150, albumin 85 per cent, the eye grounds showed hemorrhagic retinitis. Large doses of morphine were given, a lavage was done and castor oil left in the stomach; she was given a colonic irrigation and a hot pack. While under treatment she had two convulsions, but spontaneous labor followed on the second day of treatment and she was delivered of a 7 months' stillborn baby. The patient remained in the hospital three and one-half weeks after delivery and was discharged with a blood pressure of 130/90 and only a faint trace of albumin in the urine. Seventeen months later this patient, under careful antepartum care, went through a normal pregnancy and delivery, with a living child.

On the other hand, there are cases which show little or no signs of improvement and which eventually must have labor induced and the uterus emptied. We feel that in this group of cases, the patients have stood the induction of labor, and the labor itself better after observation and treatment, than had they been taken to the operating room immediately upon admission. Many of the severe, as well as of the convulsive cases, promptly go into spontaneous labor while under treatment, as the two case histories quoted demonstrate, and the desired result is accomplished without the added shock of an operative induction.

In our series of 465 cases, 100 cases, or 23.7 per cent, had pregnancy terminated or labor induced. This was done by dilatation and curettage in four cases; hysterotomy and sterilization in three; pituitrin given hypodermically in three; artificial rupture of membranes in six; introduction of bougie in 12; introduction of Voorhees' bag in 51; vaginal hysterotomy in three and abdominal cesarean section in 18.

Of the 18 abdominal cesarean sections 15 were performed for indications other than the pregnancy with toxemia. Analyzing these figures further, we find that operative induction after the fifth month of pregnancy was employed because of toxemia in only 69 cases, or 14.8 per cent.

Turning now to a consideration of the cases of pregnancy toxemia with convulsions, in our series of 465 toxic cases, 54 patients, or 11.1 per cent, had convulsions. Two of the patients had been toxic in previous pregnancies and two had had toxemia with convulsions. The onset of convulsions was in the 5th month of pregnancy in two cases; 6th month in four cases; 7th month in 12 cases; 8th month in 17 cases, and in the 9th month in 19 cases.

Of the 54 cases with convulsions 10 were private patients, most of whom were first seen after the onset of toxemia, 18 per cent; 15 were clinic patients, or 28 per cent; 29 were emergency cases, or 54 per cent. The convulsions developed before labor in 31 cases, or 57 per cent; during labor in 7 cases, or 13 per cent; and after labor in 16 cases, or 30 per cent.

The treatment of these patients has been referred to previously. Suffice it to mention here that labor was induced or hastened in 18 cases, or 33.3 per cent; by vaginal hysterotomy in 2; abdominal cesarean in 2 (both with deformed pelves); introduction of bougie in 1, and introduction of bag in 13 cases.

Of the 54 convulsive cases, there were six maternal deaths, or 11.1 per cent. Labor was induced by bags in four of these cases; in one, delivery was accomplished by version and breech extraction because of a prolapsed cord, the baby was saved but the mother died of shock. In another, a difficult instrumental delivery was done on a dead baby because the mother had had 16 convulsions before and during labor. And in the other two cases in which bags had been employed, the convulsions continued postpartum, the mothers having died of an overwhelming toxemia, in one of which autopsy showed a liver four times the normal size and containing many hemorrhages. Of the two maternal deaths occurring in cases where bags were not employed, one died undelivered after the signs of a cerebral hemorrhage had developed, while the other died following a hurried difficult forceps delivery done because of convulsions which began in the second stage and which continued in the postpartum period. The onset of the convulsions was antepartum in four cases and intrapartum in two cases. There were no deaths in the group of 16 cases in which the convulsions began postpartum. Five of the convulsive patients who died were in the eighth month of pregnancy, and only one was at term.

The end results for the babies in the 54 convulsive cases were as follows: 26, or 49 per cent, left the Hospital alive and well; six, or 11 per cent, died after birth; four being premature, one showing hemorrhages in the viscera on autopsy, and in one no definite cause was found. Twenty-one, or 40 per cent, were stillborn.

Of the 21 stillbirths, eight were macerated; one was a case of osteogenesis imperfecta; two were attributed to injuries at the time of delivery; and four on autopsy showed visceral hemorrhages. In six no definite cause was found.

In the entire series of 465 cases, there were 25 cases of twins, and one case of triplets. We must therefore account for 493 babies: 382 or 78 per cent were born alive and 111 or 22 per cent were stillborn.

Analyzing the 111 stillbirths, there were three cases in which pregnancy was interrupted by dilatation and curettage; four by hysterectomy; 45 macerated fetuses; 30 premature births; 14 due to injuries at the time of delivery; one in which the mother had meningitis; one in which the mother had a cardiac lesion and pneumonia; 10 in which no cause could be found; and three congenital anomalies, hydronephrosis, general anasarca, and osteogenesis imperfecta.

Of the 382 babies born alive 29, or 7.6 per cent, subsequently died while in the Hospital from the following causes: one congenital heart; one congenital syphilis; one congenital cleft of the abdominal wall; three showed visceral hemorrhages on autopsy; three developed pneumonia; 12 were premature; in 8 no demonstrable cause could be found. In other words 353 babies, or 72 per cent of all the babies born to toxie mothers, left the Hospital alive and well.

The maternal deaths in the entire series of 465 patients numbered 14, or a gross maternal mortality of 3 per cent. Of these 14 fatal cases, nine of which were emergency admissions, death occurred from other complicating conditions, and not from toxemia alone, in 4 cases: one case, having been delivered of triplets, showed at autopsy myocarditis, bronchopneumonia and chronic nephritis; one was complicated by placenta previa, the child being delivered by version and breech, the placenta was extracted manually and the uterus packed; one died undelivered of cardiac insufficiency, and one died with symptoms of meningitis. Therefore, the corrected maternal mortality of pregnancy with toxemia is 2.1 per cent.

In treating cases of pregnancy with toxemia a very important consideration is the Social Service Department whose visits to the homes of the patients, and whose influence on the patients, is being recognized more and more. At Sloane Hospital we are particularly fortunate in having an active and efficient Social Service Department and it is due mainly to the earnest efforts of its workers that we have been able to examine 133 of our toxic ward patients in a special "Toxic Follow-Up Clinic." For a long time it has been a question as to what after-effects pregnancy with toxemia leaves a patient. Although 133 cases is not a large series, a study of those cases which reported at our follow-up clinic, may throw some light on this subject. There was a time interval of from 10 to 22 months from the first admission of the patient to the Hospital and her follow-up examination. In this clinic, special attention has been devoted to the cardio-renal system with the following results: 50 patients, or 37.6 per cent, showed a systolic blood pressure of 140 or more; 40 patients, or 30.0 per cent, showed a diastolic blood pressure of 90 or more; and 53 patients, or 39.8 per cent, showed albuminuria of some degree.

In 92 cases, an intravenous phenolphthalein test was done and a single specimen was collected one hour after the injection; 50 of these cases, or 54.2 per cent, excreted less than 50 per cent of the dye. Of the cases which showed papillary edema, retinitis or hemorrhage in the eye grounds while in the Hospital, 31 per cent showed persistent retinal changes when seen in the toxic follow-up clinic. From these observations we find that a total of 55 cases, or 41.4 per cent, showed signs of cardiovascular renal disturbances.

Another question which commonly arises is, "What happens to these cases in subsequent pregnancies?" In our follow-up clinic we found 60 cases who were either pregnant when seen, or had been pregnant since their discharge from the Hospital; 31 of these again showed signs of toxemia, and 29 showed no signs. Nine of these cases reported having had spontaneous or induced abortions without observation at Sloane. We were, however, permitted to care for 35 of these cases through their subsequent pregnancies and confinements, and of these 11 cases or 31 per cent showed no signs of toxemia, while 24 cases or 69 per cent showed some signs of toxemia. Of these, five were mild, eleven moderate, seven severe, and one had postpartum convulsions.

In the group of 11 cases without signs of toxemia, there was one macerated stillbirth at term with no demonstrable cause. There were no maternal deaths. In the group of 24 cases with signs of toxemia there was one maternal death in a case with a severe cardiac condition. This patient when seen early in the pregnancy was advised to have a therapeutic abortion, but this was refused because of religious beliefs. She died undelivered in the sixth month of pregnancy with cardiac and renal insufficiency. In this group of 24 cases, two had spontaneous and three had therapeutic abortions. Of the 18 cases delivered, 11 babies were born alive and 7 were stillborn. Therefore, in this series of 24 cases which showed signs of toxemia in subsequent pregnancies, only 45.9 per cent had living babies, but of the 35 cases which had previously had toxemia, 11 of which were not toxic in their subsequent pregnancies, 60 per cent had living babies.

CONCLUSIONS

The incidence of pregnancy with toxemia is 6.3 per cent, convulsions occurring in 0.7 per cent of all pregnancies.

Careful prenatal care, with the hospitalization of patients showing signs or symptoms of a complicating toxemia, is essential. During the prenatal period foci of infection, especially in the mouth, should be cleared up. The home conditions of the patient should be investigated and corrected in order to eliminate any source of mental anguish or worry.

Many cases go into spontaneous labor and, even when convulsions have developed, induction should not be resorted to until medical treatment has been given a fair trial.

A "Toxic Follow-Up Clinic" is of great importance, for here the patients are observed and advised while in the nonpregnant state. Such a clinic may very properly be considered a prepregnant course of treatment leading to future improved prenatal care.

CHEMICAL HYSTERECTOMY*

BY W. WAYNE BABCOCK, M.D., PHILADELPHIA, PA.

FOR many years caustics have been used in the treatment of advanced carcinoma of the cervix. The late Dr. William Goodell popularized the use of chloride of zinc, packing the cavity left after the epitheliomatous tissue had been freely scraped away, with pledgets of cotton moistened with a solution containing 60 grains of chloride of zinc to the ounce of water. To prevent corrosion of the vaginal walls, a vaginal packing smeared with petrolatum containing bicarbonate of soda was also used. Despite the deep action of the caustic, severe secondary hemorrhage or peritonitis seems rarely to have followed the treatment. Considering that the tissue removed by the curette often formed part of the wall of the bladder or rectum, it is not surprising that vesicovaginal or rectovaginal fistula frequently followed the application of the caustic. More surprising was the decided but temporary improvement in the condition of many of the patients treated, and the exceptional apparent cure from what the surgeon believed to have been an advanced form of malignant disease.

In the caustic treatment of carcinoma of the cervix, the aim was to destroy malignant tissue and not to remove the uterus. In the adaptation of the method herewith suggested, the aim is to destroy and remove all of the disease-producing portions of the uterus in certain nonmalignant conditions. The endometrium of the cervix, corpus and cornu with a thick layer of the surrounding metrium is quickly sterilized and devitalized, and is expelled after some days as a sphacelus, looking very much like the uterus. The peritoneal covering remains with a thin layer of underlying muscular tissue; and as the large cavity rapidly contracts and becomes obliterated, there is left a fibrous mass without cavity or discharge, resembling an infantile uterus. Obviously, amenorrhea and sterility follow the operation but without impairment of the ovarian function, and the uterus is no longer permeable to gonorrheal or other pyogenic infection.

The operation offers a quick and very easy way of obtaining the effect of a hysterectomy in certain selected conditions. It may be used:

1.—*To Quickly and Permanently Destroy Infected Metrium and Endometrium.* In chronic gonorrhea and other infections of the uterus that resist milder measures, the method quickly eliminates the infected

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

tissue and prevents recurrence of the infection without the necessity of invading the peritoneal cavity. A patient has perhaps had both fallopian tubes removed, but continues to suffer on account of a residual infection in the uterus. She dreads another abdominal operation, but welcomes a simple expedient that gives the results of a hysterectomy without an incision.

Again a patient has had a subtotal hysterectomy and a troublesome infected cervix has been left. The chemical removal of the infected cervical tissue will give the relief of the more difficult excision of the cervix.

In certain acute infections of the uterus, a chemical hysterectomy is to be considered. Puerperal septic metritis has such a terrible mortality that the obstetrician should turn to any expedient that offers a ray of hope. The bacteria pass deep into the uterine walls and the invasion of the peritoneum necessitated by the operation of hysterectomy seems but to spread the infection. Chemical hysterectomy as offering a most rapid depth sterilization of the uterus should be considered in this very fatal disease.

2.—*To Produce Amenorrhea.* In this field, chemical hysterectomy must compete with radium and the x-rays. When absolute permanency, absolute sterility or the eradication of an associated infection of the uterus are desired, the caustic method offers advantage over radiation. To avoid the disadvantages of the destruction of ovarian function, the zinc chloride may be used.

In selected cases of metrorrhagia not due to malignant disease, when it is also desired to destroy the uterine function, the chemical procedure has advantages. If it is desired to conserve, as far as possible, the uterine function, radium or the x-ray is preferable.

In the metrorrhasias accompanying advanced pulmonary tuberculosis, chemical hysterectomy is to be considered. In the form of metrorrhagia that sometimes follows bilateral oophorectomy or an insufficient subtotal hysterectomy, the caustic may be used.

3.—*To Produce Permanent and Absolute Sterility.* In mental and moral defectives, chemical hysterectomy is the simplest measure known to eliminate the chance of impregnation or of uterine infection. There is not the sentimental objection to the caustic that there is to the removal of the ovaries or uterus by operation.

In advanced tuberculosis or other serious disease rendering child-bearing undesirable or exceptionally hazardous, the chemical application is to be considered.

4.—*To Eradicate Certain Inter- and Intrauterine Tumors.* Recurrent uterine polyps, submucous fibromyomas and benign interstitial tumors lying close to the endometrium may be removed by chemical hysterectomy. Recurrent pedunculated tumors of low malignancy

may be treated in like manner. We are not prepared to advocate this method for the treatment of adenocarcinoma of the fundus or other malignant uterine tumors, unless treatment by accepted measures is refused by the patient.

TECHNIC

The patient is prepared and placed in position as for a uterine dilation. Local or nitrous oxide or narcotic anesthesia may be used. The cervix and internal os are dilated sufficiently for the introduction of a uterine packer. The cavity of the uterus is explored and scrapings or discharge removed for laboratory study. A uterine packer preferably with an obturator is introduced well through the internal os, and the cavity of the cervix and uterus thoroughly packed with a narrow gauze tape impregnated with a saturated solution of chloride of zinc. During this procedure the vagina is protected by a strip of gauze impregnated with dry sodium bicarbonate that extends from behind the cervix out under the weighted vaginal retractor. The vagina is now so packed with other strips of the soda impregnated gauze that the cervix and the caustic tape issuing from the cervix, are completely surrounded.

The packing, including the caustic tape, is withdrawn in seventy-two hours or less, dependent on the amount of gauze used and the thickness of the uterine walls. If 15 mils or less of gauze are used the packing is removed in seventy-two hours; if 30 mils of gauze are used, in eighteen hours; if 60 mils, in four and one-half hours—the duration of the caustic application being equal to seventy-two hours divided by the square of the multiple of 15 mils of gauze that is used. Against this time of the application is checked the safe limits imposed by the thinness of the uterine walls. The duration of the caustic application should not exceed the number of hours represented by the thickness of the uterine walls in millimeters multiplied by two. Thus, with uterine walls only 3 mm. in thickness, the caustic should not be left in over six hours; with walls 6 mm. in thickness, not over twelve hours; 1 cm. in thickness, not over twenty hours.

Preparation of the Caustic Tape. Gauze tape about one centimeter wide is placed in a small, graduated, glass cylinder in a sufficient quantity of saturated solution of chloride of zinc to be thoroughly covered and impregnated. By moderate pressure with sterile, dry gauze sponges the excess of solution is blotted up so that it will not drop or run from the gauze. The graduated cylinder enables the surgeon readily to determine the number of mils of gauze introduced. In the introduction, the tape must not touch the vagina or external parts of the patient nor should it come in contact with sodium bicarbonate. It is also very important that the gauze pass through the

internal os and fill all portions of the uterine cavity including the cervix. If only the cervical canal is treated, stenosis and hematometra may follow.

Preparation of the Alkaline Gauze. Four ply gauze strips measuring about two inches wide when folded are opened, impregnated with dry sodium bicarbonate powder, as we would prepare a plaster of paris bandage, refolded in packages of four and sterilized in an autoclave.

If it is desired to remove most of the vaginal portion of the cervix, the alkalinized gauze should be kept from the cervix by an appropriate pad of plain gauze or metal cup. Obviously, the operative procedure is about as simple as a dilatation and curettage, and should not require over five minutes.

After-Treatment. If an opiate has been given for the operation, usually no further sedative will be required. Continued postoperative pain usually indicates some defect in technique, especially inadequate protection of the vaginal walls. Liquids may be given at once and soft diet after the second day.

The uterine slough will usually come away about the end of a week. Recurrent uterine colic may mark the expulsion of the mass. While some of our patients have been permitted to be out of bed after the fourth day, it is wise to keep the patient in bed one week, and under supervision for nine days.

Rarely is a secondary packing required. Marked secondary oozing is not usual, but should it occur, the patient should be put in the knee-chest position, a speculum inserted and the vagina carefully packed with gauze after dusting in five or ten grams of powdered alum. If the slough has not been expelled by the ninth day it should be removed by forceps or the finger, provided it is no longer attached to the uterine wall.

Chemical hysterectomy is presented as an additional measure for the removal of the essential parts of the uterus, but it is to be used with care and good judgment. It has a somewhat limited field and will not eliminate the use of radium in gynecology or the scalpel for hysterectomy. Obviously more dangerous than radium and therefore not even a competitor against the simpler forms of uterine bleeding, it has the advantage of permanency of action and the elimination of any associated intrauterine infection.

It is probably more certain than simple ligation of fallopian tubes or the use of x-rays or radium in producing sterility. Some surgeons may welcome this method as a means of escaping from an occasional very difficult or dangerous hysterectomy.

THE ROENTGEN RAY DIAGNOSIS OF NORMAL AND ABNORMAL PREGNANCIES*

BY EDWARD SPEIDEL, M.D., AND HENRY H. TURNER, M.D., LOUISVILLE,
KENTUCKY

THERE have been such important advances in x-raying obstetric and gynecologic conditions, that it is of the utmost importance that information upon this subject be generally imparted. The x-rays have proved themselves especially valuable in the diagnosis of early pregnancy.

We have practically only the absence of one or two menstrual periods and the softening of the uterus to guide us in the early months. The absence of menstruation may be an exceedingly misleading symptom, if a careful menstrual history is not taken in connection with it.

It is not unusual in young married women, who menstruate irregularly, to find a very prolonged absence of their period up to four and six months. This is associated with such a marked increase in weight and enlargement of the abdomen that the woman believes herself pregnant and consults a physician, only to learn, if he is careful enough to make an examination, that she has an infantile uterus.

According to Peterson it is just at this early stage of pregnancy that roentgenology with pneumoperitoneum is such a valuable diagnostic aid. As early as the sixth week, and more clearly thereafter, enlargement of the uterus and distinct enlargement and widening of the isthmus, at the junction of the upper and lower segment of the uterus can be shown. Formerly oxygen was injected into the peritoneal cavity, but as it is not as readily absorbed, carbonic acid gas displaced it. Some operators in fact use unfiltered air. From one and a half to two liters of the gas seem to be sufficient to assure a clear picture and there is less pain and discomfort due to overdistention of the abdomen than if larger amounts are used. Some care must be taken under abnormal circumstances to avoid cardiac embarrassment from upward pressure of the diaphragm, and although the method in most instances seems to be harmless, still DeLee reports two deaths from pneumoperitoneum.

In the early months of pregnancy in a fibroid uterus the widening of the isthmus as shown by a pneumoperitoneum is perhaps the only positive sign that can be depended upon. In pregnancy associated with fibroids there may not even be total absence of menstruation.

At times there will be a scantier discharge of shorter duration at the recurrence of each period or even a persistent metrorrhagia. In such

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

circumstances without the x-ray we have only the rapid growth of the uterine tumor and the softening of the uterine tissues between the fibroid nodules to guide us.

In the later months the x-ray should show the fetal outlines and with pneumoperitoneum even the fibroid nodules, and there can be little excuse, therefore, at this late day for the operator who, upon opening the abdomen, finds a pregnancy with his fibroid or a five months' pregnant uterus instead of a smooth myoma of about the same size.

The great difficulty with pneumoperitoneal readings will be the lack of experience in most operators. Conditions are rare in which women present themselves at the prenatal clinics before the third month of gestation, and it would be rather difficult in most instances unless there were some distinct abnormality, to get them to submit to so formidable a procedure as a pneumoperitoneum. In consequence with little experience, the recognition of widening of the isthmus in a roentgenogram of a supposed early pregnancy would be no more conclusive, than the detection of softening of the uterine tissues by expert vaginal touch.

It should, therefore, be the custom to have an expert radiographer in every large obstetric clinic in order that pictures of abnormal cases may find intelligent interpretation.

The presence of an abnormal menstrual discharge is a more or less diagnostic sign in at least two distinctly abnormal pregnancies.

In early extrauterine pregnancy such a discharge simulating menstruation and unusually free of blood clots, differentiating it from the discharge of a threatened abortion, should attract one's attention to a possible ectopic gestation. If in addition we find some softening of the cervix and a tender fullness on gentle palpation at one side of the uterus, then our suspicion is probably confirmed.

This, it strikes me, should be one of the most fertile fields for roentgen ray diagnosis especially with the addition of the pneumoperitoneum. By the latter a slightly enlarged uterus and the outlines of the distended tube should show in the picture.

A direct x-ray would rarely be available because rupture or tubal abortion occurs, in most instances, before the deposit of lime salts in the skeleton could show the fetal outlines. It is claimed by physiologists that the deposit of lime salts in the fetal bones does not begin until after the tenth week.

No extrauterine pregnancies suspected or diagnosed before rupture have come into our service during the preparation of this paper, so it is not possible to prove the statement just made. Obstetricians more fortunate should make an effort to have a pneumoperitoneum made when they have such cases in order to prove whether these deductions are correct. If so, then we have made a marked advance in the early diagnosis of extrauterine pregnancy.

I have a splendid picture of a chronic salpingitis made with pneumoperitoneum. The uterus and distended tubes show clearly in the roent-

genogram and demonstrate that a tube distended with an extrauterine pregnancy should register as well.

The only other sign of distinct value in early pregnancy is the abnormal softening of the lower segment of the uterus, and when it can be obtained definitely it justifies one in making a positive diagnosis of pregnancy. The expert obstetrician may determine in his mind from the softening of the cervix and uterus associated with the absence of one or more menstrual periods that the patient is pregnant, but he would rarely risk upon that alone to make a definite statement where the reputation of a young woman is at stake. During the war I did not hesitate to make a positive diagnosis of pregnancy in all early cases where Hegar's sign could be obtained.

In uterine hydatids the peculiar serosanguineous discharge free from clots, especially associated with a uterus that is larger than the estimated period of gestation, should lead to a diagnosis.

A pneumoperitoneum showing the outlines of a uterus the size of a four months' gestation or more and the absence of any fetal outlines by the x-ray, as could ordinarily be demonstrated in a uterus of that size, should settle the diagnosis.

Uterine hydatids are said to occur once in from 2500 to 20,000 pregnancies according to various textbooks. I encountered three in six months a number of years ago and have not seen a case since. It is again not possible in consequence to prove the statement just made by an illustration, but pneumoperitoneums in other cystic conditions would make it appear reasonable that a definite diagnosis could be attained in this manner.

Carelli in an article on pneumoperitoneum published in the April, 1923, number of the *American Journal of Roentgenology*, shows in a number of beautiful illustrations ovarian cysts of various sizes associated with pregnant uteri.

It is to be hoped that the x-rays will prove of some benefit in refinements of the diagnosis of pregnancy in the later months. It should be possible, for instance, by means of the roentgenogram with pneumoperitoneum, by the relation that the head of the fetus bears to the lower segment of the uterus, to determine the degree of encroachment of the placenta upon the internal os, whether we have a central, lateral or marginal placenta previa.

The x-ray is of especial value in those cases of pseudocyesis that occur rather frequently near the expected menopause, and most often in women that are rapidly taking on flesh.

In many such cases the absence of the menstrual periods due to the climacteric and the enlargement of the abdomen due to the deposit of fat, convinces the patients that they are pregnant. They are absolutely certain in many instances that they feel fetal movements. In many such cases the obstetrician is confronted with a large abdomen with such a thick cushion of fat that nothing definite can be felt or heard through

it, and a vagina that is so long and narrow that but little can be gained from such an examination. In such circumstances, it is best after a preliminary purging with castor oil to put the patient under nitrous oxide anesthesia, then with the greater part of the hand inserted into the vagina and the abdomen relaxed under the anesthetic, it should be possible in most instances to make a definite diagnosis. If there is still an element of doubt then the absence of fetal outlines in an x-ray picture should be conclusive, as these cases always come to our notice in the latter months of a supposed pregnancy when a definite picture should be possible.

We have been relying upon the absence of fetal movements and fetal heart sounds for a diagnosis of death of the fetus. In especially favorable circumstances the diagnosis should become conclusive if the fetal head can be palpated through the partly dilated os and the bones are freely movable. According to Horner, the x-ray in such cases should show distinct overriding of the bones and asymmetry of the fetal head, and this again should prove to be a valuable aid to a diagnosis of fetal death.

Ovarian cysts should no longer be confounded with a pregnancy, for the reason that if an acute condition exists that demands an immediate operation, then a vaginal examination with the full hand and the patient under anesthesia prior to the intended operation, should establish a diagnosis. In cases that are not so urgent, an x-ray picture with pneumoperitoneum should settle any question of doubt. If a pregnancy complicated with an ovarian tumor is suspected, then a pneumoperitoneum should outline both organs, showing the widened isthmus and enlarged uterus in the early months and the fetal outlines in the late months, alongside of the shadow formed by the ovarian tumor.

Whether the x-ray will come into general use for measuring the diameters of the pelvis will depend upon simplifying the methods that are in use at present. The difficulty in reading such a roentgenogram and measuring the diameters is due to the fact that the parts of the pelvis farthest away from the plate are distorted. In consequence special scale plates, ruled in such a way as to show the same distortion, plumb bobs to give a definite point to measure from, and other complex mechanical contrivances and rather complicated mathematical calculations are necessary at present in order to arrive at an accurate result. With these means, however, expert radiographers appear to be able to get more definite measurements than can be obtained by the ordinary methods of pelvimetry.

As Spalding states, "The method is too expensive to be used as a routine, but will be found very helpful in cases with suspected abnormalities of the pelvis detected either with the usual methods of pelvimetry or from an abnormal progress of labor."

The x-rays are of inestimable value in moderately contracted pelvis, because they give an outline of the superior strait and enable one to

determine, by the relation of the fetal head to that outline, more nearly what course to pursue when the patient goes into labor. It enables one to decide whether it is advisable to give such a patient the benefit of a test of labor with the possibility of a more or less normal outcome, or to do an elective cesarean section, when the picture shows that no other method of delivery is feasible.

In patients with apparently normal measurements, in whom a first pregnancy may end in a difficult labor and perhaps death of the fetus, the x-ray may show some abnormality or obstruction at the inlet or outlet of the pelvis, that readily accounts for the previous difficulty and will aid in deciding upon a different method of delivery in a succeeding pregnancy.

The x-ray will be of most value in those pregnant cases where a gross deformity and abnormal pelvic measurements, obtained in the ordinary manner, lead one to expect difficulty in delivery. In such cases the contour of the superior strait as shown in an x-ray picture will be of more aid in arriving at a probable method of delivery than the pelvic measurements previously obtained. Cases are few in which a slight difference in pelvic measurements will be the determining factor in the conduct of an abnormal case, the size and adaptability of the fetal head in relation to such abnormality being the final factor after all.

It should be possible in nearly all instances to show the fetal skeleton by x-ray after the fifth month of gestation. Physiologists state that the deposit of lime salts in the fetal bones does not begin until after the tenth week, and it stands to reason that a considerable deposit of such salts must be present before the bones will be outlined in an x-ray.

Even at ninety days, Horner claims that the density of the ossification centers of the fetal bones is not great enough to show through the abdominal and uterine walls and liquor amnii, and at one hundred and twenty days only that part of the fetus over the inlet is demonstrable, the rest being obscured in liquor amnii, muscle and maternal bones. It follows, accordingly, that one need not expect to secure an x-ray of the fetal outlines before the end of four months of gestation.

It is at times impossible to get a successful x-ray in an anteroposterior direction. In such circumstances a lateral view will often yield a successful picture.

For teaching purposes x-rays of the pregnant woman near full term are invaluable. They show clearly by the skeletal outlines the presentation and position of the fetus, so that the various positions of the head and their relation to the cardinal points on the pelvis can be shown. Breech and transverse presentations are readily demonstrated.

The x-ray is certainly the most definite agent in diagnosing multiple pregnancy, as the outlines of the two fetuses can readily be seen in a good picture and there can be no disputing such a diagnosis.

In cases that are postmature, the relation of the presenting head to the outline of the superior strait, as shown in a good x-ray plate, should

offer more accurate information than the measurements of the height of the fundus and the attempts to measure approximately the diameters of the fetal head through the abdominal and uterine walls of the patient as practiced by Reed and others.

Warnekros of Berlin, in an illustrated article presented before the Association of Obstetricians and Gynecologists of Berlin five years ago, may well claim to have reached the very extreme of roentgenology in obstetrics as he actually demonstrated the mechanism of labor in the living women by a series of roentgen ray pictures. These also prove his assertion that the fetus does not present the compact attitude described in all the textbooks, the head is not flexed, the spine is bent but little and the extremities lie as loose and unrestricted as the cavity of the uterus will permit.

Warnekros was also able to demonstrate frequent changes of position in pregnancy and even noticed the spontaneous change of a breech into a vertex at full term.

It would seem, therefore, that there is no limit to the availability of the roentgen ray in the demonstration of obstetric and gynecologic conditions. In early pregnancy it should be possible by pneumoperitoneum to bring into distinct relief the enlarged organs of gestation, while in the later months the outlines of the fetus clearly pictured should remove any doubts as to the condition and show any abnormalities present besides.

Dr. Henry H. Turner, to whom I am indebted for the x-ray work in connection with this paper, states that in a series of fully 300 cases, x-rays of the fetus after the fifth month were almost invariably constant. Without pneumoperitoneum the earliest fetal shadows showed at three and a half months, with two at four months.

With the aid of pneumoperitoneum the normal uterus with tubes and ovaries can be shown and the gradual increase in size of the pregnant uterus visualized. As mentioned by Warnekros it has been possible to demonstrate by x-ray the conversion of a frank breech into a cephalic presentation shortly before active labor.

There is no question that with the aid of the Bucky-Potter diaphragm, intensifying screens and Eastman superspeed films, positive and constant diagnosis of pregnancy can be made after the fifth month, and with pneumoperitoneum there is little excuse for failure to differentiate between pregnancy and conditions simulating it.

REFERENCES

- (1) Bartholomew, R. A.: Jour. Am. Med. Assn., April 2, 1921, p. 412. (2) Bell, J. Warren: AM. JOUR. OBST. AND GYNEC., December, 1921. (3) Carelli, Humberto H.: Am. Jour. Roentgenology, April, 1923, p. 259. (4) Horner, D. A.: Surg., Gynec. and Obst., July, 1922. (5) Peterson, R.: Jour. Am. Med. Assn., February 11, 1922, p. 74. (6) Von Zwalbarnberg: Jour. Radiology, 1922. (7) Warnekros: Ztschr. f. Geb. u. Gynak., lxxx, 719.

RESULTS OF RADICAL SURGICAL TREATMENT OF PRO- CIDENTIA BY THE MURPHY, COLLINS AND JACKSON OPERATIONS*

BY E. P. SLOAN, M.D., BLOOMINGTON, ILL.

THIS discussion will be confined to the surgical treatment of uncomplicated procidentia, or prolapse of the uterus or bladder and rectum to an extreme degree.

Hippocrates gave a very striking and accurate description of procidentia uteri and described a wooden pessary. But the surgical treatment is of comparatively recent times. Among the first really important contributions to the radical surgical treatment of procidentia was that of Professor Olshausen of Berlin, who published a paper upon this subject in 1886.

In 1887 Howard Kelly published in the *American Journal of Obstetrics* a paper entitled "Hysterorrhaphy." Various operations were soon developed and reported under various names, such as suspension of the uterus, ventrofixation, hysterorrhaphy, and hysteropexy, and Alexander's operation for shortening the round ligaments, all having for their principle either suspension by the round ligaments, or suspension by a peritoneal band of adhesions formed by temporary fixation of the uterus to the peritoneum of the abdominal wall, above the pubes. It was soon discovered that the success of most of these operations depended upon holding the uterus in the anterior position.

In 1895 Kocher advocated fixing the body of the uterus into the anterior abdominal wall. The entire uterine body was retained and while it was usually successful so far as the cure of the procidentia was concerned, yet frequently, when the uterus was large, the tumor in the abdominal wall so formed was quite noticeable and caused much pain. Various degenerations and tumors sometimes developed in the retained body of the uterus. In the majority of cases the operation was followed by a persistent foul irritating discharge, especially when atrophy had not previously occurred.

In 1900 Gilliam contributed his modifications of the Ferguson operation entitled "Round Ligament Ventrosuspension of the Uterus." The Watkins-Wertheim method by the vaginal route was developed and is quite satisfactory for moderate prolapsus with cystocele when the uterosacral ligaments are intact. Vaginal hysterectomy has been done by many, with narrowing of the vaginal canal. This was usually only

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

temporarily successful, as sclerotic tissue under tension gives way in time.

About 1906 the Mayo's developed their suspension operation by which vaginal hysterectomy is done and the broad ligaments resected and firmly sewn together as high up in the pelvis as possible. The bladder is attached to the superior border of the connected broad ligaments, and the vaginal vault is attached to the stumps of the broad ligaments. This operation with perineal repair is quite satisfactory in a large percentage of cases.

There yet remained, however, a certain number of cases in which none of these operations were safe, effective, and perfectly satisfactory. The need was apparent for a satisfactory operation that would elevate and furnish radical support to the apex of the inverted cone, formed by the sagging pelvic diaphragm, so that the apex of the cone is upward. In the pelvic diaphragm are included the uterosacral ligaments, and the true and false ligaments of the bladder. I will briefly mention four operations devised to meet these conditions.

In 1910 John D. Murphy, published a description of a method of fixing part of the uterus in the abdominal wall, that has some features in common with Koehler's operation. It is, however, very different in one respect. Instead of leaving the entire body of the uterus in the abdominal wall, he split the uterus longitudinally and removed most of the body of the uterus leaving only two outer flaps that were spread out on the external surface of the recti muscles and sutured there. He advocated a Pfannenstiel incision, the aponeurosis of the oblique muscles covering the uterine flaps. The difficulty with this operation is that infection will often extend from the cervical canal up between the uterine flaps and the fascia. In fact, a large percentage of these operations require long drainage and are usually followed by a fistula that persists for some time. Furthermore, the cut surfaces of the uterine flaps are directly in contact with the fibers of the aponeurosis of the external and internal oblique muscles; *there is no peritoneal barrier*. Fascia and muscle do not unite readily.

In 1916 Dr. C. U. Collins of Peoria, Illinois, reported an operation somewhat similar to Murphy's, by which a strip of the fasciæ fibers of the aponeurosis of the abdominal oblique is transplanted into the uterine stump in such a way that it supports the remaining part of the uterus, and the uterine stump supports the pelvic diaphragm and makes a permanent fixation that can in no possible manner give way. It leaves the uterine stump completely invested with peritoneum, a most important consideration. It is necessary, for the performance of this operation, that the aponeuroses of the external and internal obliques have not been cut. Therefore, this operation cannot be performed when the patient has previously been subjected to laparotomy with a median incision.

In 1918 Dr. Jabez Jackson described an operation along similar lines in which a median incision is used. The operation is performed in a manner similar to the Murphy operation, except that instead of anchoring the stump of the uterus between the rectus muscles and spreading the flaps on the recti, a horseshoe shaped piece is removed from the middle of the uterus, leaving a small lateral portion down each side from each cornu to the cervix. After closing the cervix Jackson sutures the anterior and posterior peritoneal edges together forming a horn at each cornu. These horns of uterine muscle with the ends of the broad ligaments are brought out through openings in the recti muscles and sewn together above a portion of the recti muscles. He lays great stress upon leaving the broad ligaments attached so that the circulation of the ovary is not interfered with. By the use of one of these two operations it is possible to support the floor of the pelvis by permanent anchorage of the uterine stump to the abdominal wall in almost every extreme case of procidentia uteri.

If the uterus has been previously removed and there is prolapse of the bladder and rectum, the condition is much harder to relieve. The only point of support that is usable is the scar tissue formed at the site of the hysterectomy. The bladder is separated from the rectum as high as possible through the scar at the apex of the vagina. The knob of a curved elevator is placed in the opening in the vault of the vagina and while an assistant pushes the knob of the elevator up into the abdomen, the peritoneum in Douglas' pouch posterior to the old scar is opened from above, and a dissection made between the scar tissue and rectum until the knob of the elevator is encountered. This permits the tip of the vagina to be drawn upward carrying with it the old scar that is usually adherent to the stumps of the broad and uterosacral ligaments and base of the bladder. Usually by the separation of some adhesive bands the tip of the vagina can be brought up between the recti muscles above the pubes. The scar tissue remaining from the previous operation is sewn to the fascia. Portions of the broad ligaments and the round ligaments are usually found to be more or less closely attached to the old scar. Two or three sutures can usually be inserted on either side attaching the edges of the recti muscles to these remaining portions of the broad and round ligaments. The openings in the vagina and peritoneum, posterior to the old scar, should be closed laterally and the abdominal incision closed in the usual manner.

The radical cure of procidentia is not permissible when the woman can possibly have children. But in cases where childbearing for any reason is impossible, and the aponeurosis of the oblique muscle intact, the operation of choice for the radical cure of procidentia is the Collins operation, with a Pfannenstiel incision.

In case a median incision has previously been made and the fascia cut use the Jackson operation with a median incision.

In case the uterus has previously been completely removed, the only radical operation that I have found successful is the elevation of the old sear and the vault of the vagina, and their fixation in the abdominal wall.

The first step in either operation should be to grasp the cervix with a tenaculum forceps and push it upward against the anterior abdominal wall. By this means the operator can estimate, with a fair degree of accuracy, the result to be expected from such suspension. With the other hand on the abdomen it is easy to accurately estimate just where the implantation should be made. For the Collins operation it is necessary to determine this point before the abdominal incision is made. Should one elect to destroy the cervical mucosa by cautery, the cauterization should be done next. Care should be taken that the cauterization extends up above the internal os. Should there be a cystocele of the type that is really a hernia with thinning of the anterior vaginal wall, a cystocele operation may be done, with closure of the opening in the vaginal wall from side to side, narrowing the vagina but not shortening it. It is needless to say that the perineum should be repaired if necessary.

In making the abdominal incision for the Collins operation the skin and fatty layer should be cut down to the aponeurosis of the external oblique muscle. Then the aponeurosis of the external and internal obliques should be separated transversely and raised upward, exposing the recti muscles for a distance of three to four inches. One to four blood vessels are always seen coming out of the recti muscles and entering the aponeurosis; these blood vessels should be cut and tied. If they are torn the upper ends usually retract through the fascia and cannot be caught, and a hematoma is likely to form after the operation.

An illustration by Murphy shows the incision to be made one inch above the pubes. If the suspension is made at a point only one inch above the pubic bone there is usually trouble with the bladder afterward from lack of room. The higher the implantation is made on the abdominal wall the more room is afforded the bladder, and the less the possibility that loops of intestine will get caught in the space between the cervix and the pubes.

In women who have borne children the recti muscles are usually found to be separated for a space of about one inch. An opening through the peritoneum is made between these muscles, the uterus is delivered outside the peritoneal cavity, the tubes are removed or resected. If necessary, the upper portion of the broad ligament is separated from the uterus and attached to the under surface of the parietal peritoneum. The peritoneal opening is closed around the cervix and the recti muscles brought together above and below. The upper portion of the uterus is removed by *transverse* incision, leaving anterior and posterior flaps.

A strip of the combined aponeurosis of the internal and external obliques is now placed in the notch and the flaps are sutured over. This leaves *the uterine stump completely invested with peritoneum* and not only favors early attachment to the surrounding structures and union by first intention, but *it protects all the surrounding structures from the extension of infection from the cervical canal*. When possible the ovarian ligament and round ligament should be left in the flap and care should be taken that the ascending uterine artery is not injured, and the circulation of the flaps and the ovary interfered with. The edge of the upper fascia is then brought downward over the stump of the uterus and attached to the fascia below.

In the Jackson operation the same procedures are followed, except that the median incision is used, and then the central portion of the uterine body removed, leaving the round ligaments, ovarian ligaments, and a small strip of uterine tissue extending downward from each cornu. The anterior and posterior peritoneal edges of the uterine stump are brought together. Then a small portion of the inner edges of each rectus muscle, together with some peritoneum is placed between these two horns. The horns are brought together over this portion of the rectus muscles and sutured together. The abdomen is closed in the usual manner.

In doing either the Collins or the Jackson operation I think it much better to remove the tube or at least a section of the tube next to the uterus, than to bring the end of the tube into the abdominal wall. The cut end of the tube can be fastened in contact with peritoneum. If a Collins operation is to be done and tumors are present, or the uterus is large, the upper part of the broad ligaments may have to be severed, the greater part of the uterus removed, and more of the cervix brought up between the recti muscles. With the Jackson operation it is rarely necessary to separate any portion of the broad ligaments from the uterus except the tubes.

The treatment of the cervix is the most important step in doing either one of these operations. The entire lining of the cervix together with the gland bearing area should all be either dissected out or destroyed with the cautery. While making the flaps, the removal of the inner portion of the cervix is not a difficult procedure if a spatula-shaped knife is used, not too sharp for the circular dissection. The cervix is flattened, and the anterior and posterior walls of the remaining shell of the cervix are brought together when the surrounding structures in the pelvic diaphragm are placed in upward tension by the suspension. I have had better results when no sutures were used to close the cervix.

I performed the Murphy operation twenty-eight times. In every single case drainage was instituted, or had to be instituted. Nineteen cases had a fistula that persisted over four months, eight of these required operation for removal of fistula. In six cases the drainage

stopped and the fistula closed in three months. Two cases were drained for only six weeks. I have no record of the other case after she left the hospital. Sixteen of these patients were troubled with an irritating discharge afterward.

We have performed the Collins operation one hundred and nineteen times. Fourteen of the early cases were subsequently bothered with offensive discharge from the cervix. One recent case in which the cervix was apparently healthy, and in which the cervical membrane was not destroyed at time of operation, subsequently required cauterization. Of these one hundred and nineteen cases not one has had drainage for more than four weeks. Ninety-two of them were classed as primary union, there being no drainage after five days.

We have performed the Jackson operation sixteen times. None of these patients have developed postoperative cervical discharge. None have required drainage for more than four days. The results from this operation have been as satisfactory as those from the Collins operation with the exception of slight pain that persists for some months. I attribute this pain to the compression of, and tension upon, the portions of the sensitive rectus muscles encircled by the uterus. In the Collins operation the uterine stump is supported by the only slightly sensitive fascia fibers and so no tension pain occurs.

I have attempted to perform suspension of the vault of the vagina, when vaginal hysterectomy had previously been done, twenty-two times. Twelve of these were entirely successful; four were successful after subsequent operation for narrowing of the vagina; three could not be anchored to the anterior abdominal wall at all and were anchored to flaps from the recti and oblique fascia with only fair results. With three I failed to make the dissection between the vagina and rectum.

THE SLOAN CLINIC.

(For discussion see page 720.)

REPORT OF A CASE OF A LARGE INTERSTITIAL FIBROMA OF CERVIX—OPERATIONS*

BY RUFUS B. HALL, M.D., CINCINNATI, OHIO

I REPORT this interesting case because of its rare occurrence. Many of the textbooks do not refer to this condition at all. It is mentioned very casually by Montgomery (*Textbook of Gynecology*) and by Kelly and Noble (*Gynecology and Abdominal Surgery*) the latter merely stating the fact that fibroids do occur in the cervix. Palmer Findley in his book, *Diagnosis of Diseases of Women*, refers to the subject more fully and describes fibroids as submucous, interstitial and subserous and gives an illustration of each. He says the subserous type may grow into the vagina or into the paravaginal connective tissue. I reported a case of the latter variety to this Association at its twelfth meeting in Indianapolis in 1899, and exhibited the specimen. One might infer, judging from the scarcity of literature that these growths were not of much consequence. But for one to develop as interstitial and of such a size as to cause severe pressure symptoms, is a rare occurrence and worthy of record.

The subject of this report, Mrs. W. A. T., aged forty-four years, was referred by Dr. John N. Ellison, Portsmouth, Ohio, on January 5, 1920. The patient was a poor, hard-working housewife, mother of nine children, the youngest being eleven years old. The patient always enjoyed good health until her recent illness and never had any serious sickness nor any unusual pelvic distress until some eighteen months ago. During this time the periods had been prolonged. Formerly they were two and a half and three days in length, recurring regularly every twenty-eight days, but for the last year or more the periods recurred every twenty-one or twenty-two days and continued six or seven days, and one period recently continued fourteen days. The periodical flow was more excessive, but did not amount to a real hemorrhage. Like many patients at her age, she thought her condition was all due to the approaching menopause, and did not consult Dr. Ellison until she had a retention of urine on December 29, 1919, a few days before her visit to me. At that time she did not consult him in reference to her tumor and irregular and excessive bleeding, but on account of the inability to empty the bladder. After examination, operation was at once advised.

When placed upon the examination table the tumor presented at the vulva so that the lips were separated for more than two inches. The patient was wholly unable to empty the bladder. The pelvis was entirely filled by a hard immovable tumor so that it was with great difficulty that a finger could be introduced into the vagina.

The tumor could not be pushed out of the pelvis. The cervix could not be located. The patient had a thin abdominal wall and through that, the fundus of the uterus could be palpated and two small fibroids not larger than one inch in diameter could be outlined upon the fundus. The patient was suffering greatly from pressure symptoms. The diagnosis was made of fibroid tumors of the uterus with the principal tumor in the anterior lip of the cervix. An operation was urgently needed and was performed the following day. It was decided to do just what was necessary to secure relief. When the patient was under an anesthetic, the

*Read at the Thirty-sixth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Philadelphia, Pa., September 19-21, 1923.

examination showed there was no pedicle to the tumor. I decided to remove it through the vagina if possible and to do a hysterectomy if necessary. By making an incision over the presenting part with a blunt dissector, the tumor was enucleated. The operation was exceedingly easy and almost bloodless, only one bleeding point requiring a ligature.

After the removal of the tumor, it was easy to determine that excepting the two small fibroids on the fundus the uterus was otherwise normal, and no further operation was necessary.

628 ELM STREET.

DIABETES MELLITUS IN PREGNANCY*

BY HERBERT J. WIENER, M.D., NEW YORK

(Assistant Attending Physician, Sloane Hospital for Women. Chief of Metabolism Clinic, Vanderbilt Clinic.)

THE carbohydrate metabolism of the normal pregnant woman may be said to be in a more labile condition than in the nonpregnant. This is evidenced by the comparatively frequent appearance of traces of glucose or lactose in the urine, and also by the greater tendency to acidosis in the pregnant state. It seems reasonable to ascribe this instability to the changes in structure and probably also in function which pregnancy is known to induce in certain organs of internal secretion. The thyroid, the anterior lobe of the pituitary, as well as the chromaffin system hypertrophy in pregnancy, and the increased activity of these sugar-mobilizing organs might be expected to affect the glycolytic function of the pancreas. There is also apparently a reciprocal influence between the gonads and the pancreas, for in diabetes mellitus disturbances of sexual function such as amenorrhea, sterility, and impotence are common. Changes in the islands of Langerhans in pregnancy have been described, and similar changes have been found in the pancreas in castrated animals. The pancreatic activity is no doubt modified in normal pregnancy, yet permanent pancreatic damage is very rare. In fact it is doubtful whether diabetes mellitus ever develops in pregnancy uncomplicated by toxemia.

Glycosuria occurring during the course of pregnancy may indicate the existence of one of three separate clinical entities, namely, (1), renal glycosuria; (2), a type of diabetes peculiar to pregnancy; and (3), true diabetes mellitus as evidenced by the classical symptoms and clinical course.

Lactosuria, which has no significance, occasionally occurs toward the end of pregnancy. It is, therefore, necessary to apply the differential phenylhydrazine and fermentation tests to a reducing substance in the urine of the pregnant woman.

*Read at a meeting of the Sloane Hospital Alumni Society, October 26, 1923.

1. *Renal glycosuria*.—The not infrequent appearance of traces of glucose in the urine in pregnancy, with a normal blood sugar level, may be attributed to a lowering of the renal threshold. Such a typical renal glycosuria has been noted to occur in nonpregnant individuals in the presence of focal infections, and to have disappeared when these foci have been eliminated. Possibly end-products of the fetal metabolism may in like manner affect the renal threshold of the maternal kidney. The proven changes in the concentration of the inorganic constituents of the maternal blood during pregnancy, particularly calcium, also might be a factor in the alteration of the renal threshold.

This low renal threshold for glucose is so constant a feature of normal pregnancy, that it has been successfully utilized as a diagnostic test for pregnancy, by means of the administration of sugar by mouth, or the injection of minimal quantities of phloridzin or adrenalin.

The amount of sugar excreted in cases of renal glycosuria is usually from 0.2 to 0.3 per cent, amounting to 3 to 5 grams in twenty-four hours. Increased carbohydrate intake has little or no effect. A glucose tolerance test in these patients yields a normal blood sugar curve; in fact frequently the blood sugar level does not even rise to the usual level of the nonpregnant.

The carbohydrate allowance of these patients should not be reduced. The glycosuria disappears promptly after delivery.

2. *Transient Diabetes Mellitus of Pregnancy*.—The second group of glycosurias in pregnancy is represented by cases which develop a hyperglycemia and a high concentration of glucose in the urine, without clinical symptoms of diabetes mellitus. Two such cases have been observed among the admissions to the Sloane Hospital during the past two years. In both cases there were definite symptoms of a mild toxemia of pregnancy.

The first of these, a colored woman, gravida iv, (age 22, Ht. 65 inches, Wt. 227) had a history of three normal pregnancies and normal deliveries. She was admitted to the hospital twelve days before delivery because of the presence of edema of the legs and abdominal wall and a blood pressure of 132/70. A trace of albumin was found in the urine on the second day after admission. The fasting blood sugar was then 91 mg. per cent with a trace of sugar in the urine at the time. The 24-hour collection of the same day, 1020 c.c., showed a concentration of 2 per cent of glucose, a total excretion of 20.4 gm. The diet, which contained approximately 300 gm. carbohydrate, was not modified, and two days later the fasting blood sugar was 133 mg. with 2.3 per cent in the 24-hour collection of 1500 c.c., or 34.5 gm. On the following day the 24-hour urine amounted to only 840 c.c., yet contained 4.4 per cent glucose, or 37 gm. On the next day, two and one-half hours after an intake of 36 gm. CH, the blood sugar was 250 mg., and the urine voided at the time contained 9.2 per cent glucose. The CH intake was then reduced to 100 gm. per day. On the following day the patient was delivered of a stillborn child, (breech presentation). The autopsy diagnosis was cerebral edema and congestion. Two days postpartum the urine contained 0.75 per cent glucose, 4.9 gm. in twenty-four

hours. The fasting blood sugar on the fifth day postpartum was 130 mg. with 0.7 per cent glucose in the urine at the time. Nine days postpartum the 24-hour excretion was 8 gm. On the eleventh day postpartum the fasting blood sugar was 111 mg., with 0.2 per cent glucose in the urine at the time.

This patient was discharged in excellent condition 16 days postpartum. Throughout there had been no polyuria, polydipsia, or other clinical signs of diabetes mellitus. Ketone bodies were never found in the urine. Three months later, during which interval she had been on an unrestricted diet, the blood sugar taken one and one-half hours after an intake of 100 gm. of CH was 133 mg., with no sugar present in the urine.

The second case of this type, a colored woman of thirty-eight, (Ht. 64 inches, Wt. 206) para v, gravida ix, admitted September 21, 1923, had had two previous severe attacks of toxemia of pregnancy. The last attack, which was accompanied by persistent pernicious vomiting and jaundice, necessitated a therapeutic abortion at three and one-half months in September, 1922. Previous to this operation, she had received two intravenous 10 per cent glucose infusions two days apart. The first infusion contained 110 gm. of glucose, the second 80 gm. Following the operation 0.5 per cent glucose appeared in the urine, which again became sugar-free five days postoperative.

TABLE I

	BLOOD			PLASMA		24 HOUR URINE			
	SUGAR MG.*	N.P.N. MG.*	URIC ACID MG.*	CALCIUM MG.*	CHOLESTEROL MG.*	QUANTITY C.C.	GLUCOSE PER CENT	GLUCOSE GM.	DIACETIC
Sept. 23	166	27.8	3.5	11.33	255	900	4.	36.	0
" 24	...	...	..	....	...	700	1.43	10.	0
" 25	...	...	..	....	...	1050	1.74	18.3	+
" 26	...	...	..	....	...	550	1.17	6.5	++
" 27	...	...	..	....	...	1050	0.1	1.	0
" 28	...	...	..	....	...	2050	Tr.	...	0
" 29	138	28.6	4.3	11.24	...	700	1.	7.	0
Oct. 1	...	...	..	....	...	1000	0.38	3.8	0
" 2	123	23.6	3.8	....	235	1400	0.1	1.4	0
" 3	...	...	..	....	...	1000	h. tr.	...	0
" 4	...	...	..	....	...	1250	h. tr.	...	0
" 5	121	...	4.1	10.44	...	1050	1.1	11.5	0
" 10	100	...	..	10.44	...	....	....	...	..
" 17	111	...	..	....	...	....	....	...	..
" 25	101	18.	1.5	11.14	...	...	...	...	...
" 30	101	...	2.8	11.02	226	...	...	...	...
Nov. 20	146	...	4.	10.92	299	...	...	...	...

*Per 100 c.c.

She again became pregnant in March, 1923, and was admitted to the hospital September 21 in the seventh month, because of glycosuria and subjective symptoms of mild toxemia. Her fasting blood sugar on admission was 166 mg. (Table I.). The 24-hour urine contained 4 per cent glucose, 36 gm. in 900 c.c. Up to this time she had been on an unrestricted diet. Her COH intake was now reduced to approximately 60 gm., and the urinary sugar decreased progressively to 0.2 per cent on discharge twelve days later. The 24-hour volume varied between 900 and 2000 c.c. The fasting blood sugar level dropped to 121 mg. She was now placed on a diet containing 100 gm. COH, and on two subsequent visits during

October the blood sugar two hours after breakfast of 40 gm. COH was 100 and 111 mg. The urine contained a trace of sugar at the time, as did the 24 hour specimens. She was readmitted October 25, because hypertension had developed and albumin was found in the urine. The fasting blood sugar was then 100 mg. with no sugar in the urine at the time. She was again discharged after two weeks of treatment for the toxemia, and during this period there was no glycosuria with a diet containing 200 gm. COH. She was readmitted November 15, and delivered November 17 of a living child. On the third day postpartum the fasting blood sugar was 146 mg. with a trace of glucose in the urine at the time. Traces of glucose were found in the urine (0.1 to 0.2 per cent) up to the day before discharge, November 30, when it cleared up entirely.

These cases resemble those described in the literature in which glycosuria of marked degree has occurred during a pregnancy to disappear again postpartum. In some the sugar in the urine was again found to be present in a succeeding pregnancy, while in others it did not recur. The accompanying toxemia in the two cases detailed above was of mild degree, but should be considered as possibly etiologically connected with the glycosuria. The fact that both patients were obese women should also be noted. Apparently this form of glycosuria is caused by a transient functional insufficiency of the islet tissue of the pancreas. Functional recovery appears to be complete after delivery.

3. *Pregnancy in Cases of Diabetes Mellitus.*—Von Noorden's statistics of 427 diabetic women in the childbearing period have shown that pregnancy occurs in only 5 per cent. Although in the more severe cases conception is less frequent than in the milder form, the incidence of sterility does not run parallel to the severity of the disease. My own experience is confirmatory of the above, for of the twenty diabetic women in the childbearing period followed at the Vanderbilt clinic during the past six years, only one, and that one a severe case, became pregnant. It is presumed, although without definite pathologic evidence, that diabetes may cause sufficient damage to the ovaries to bring on complete sterility. Statistics of 58 cases reported in 1909 showed a 30 per cent mortality from diabetic coma either during labor or immediately postpartum, and a 21 per cent mortality within two and one-half years following labor. A number of cases of diabetes have been reported in which a slight improvement was observed during pregnancy, or at least no progression in the condition, but the majority of observers have noted the distinctly detrimental effect of a pregnancy. The intrauterine mortality for the child has been stated to be 50 per cent, and in contrast to the improvement in the maternal condition after death of the fetus in the various toxemias of pregnancy, in the diabetic death of the fetus was frequently followed soon after by the death of the mother in coma. A certain number of premature and weakly infants some with hydrocephalus and congenital diabetes were born of diabetic mothers. Extreme hydramnios has fre-

quently been the indication for premature induction of labor. The majority opinion in the past has recommended interruption of the pregnancy at an early period in its course.

In the following case the patient became pregnant two and three-quarter years after the onset of diabetes. There was no familial history of diabetes, and the patient's own history up to the time of her first pregnancy in 1919 was irrelevant. A report from the Lying-in Hospital states that she then suffered from a severe toxemia, with marked edema, hypertension, large amount of albumin, hyaline and granular casts, but no sugar in the urine. She improved under treatment, but left against advice and was confined at home a day later being delivered of a stillborn child September 7, 1919. Convalescence was uneventful, and she felt perfectly well until the first symptoms of diabetes appeared five months later, in February, 1920. Her weight at that time was 132 pounds. Her treatment was directed by Dr. Geyelin from the fall of 1920 to July, 1922. When she first came to the Vanderbilt Clinic in August, 1922, aged twenty-four, she weighed 111 pounds, (Ht. 62 inches,) and had 40 gm. of sugar in 2400 c.c. of urine, on a diet of C. 20, P. 60, F. 120. (Table II.) Her blood sugar was 364 mg. per 100 c.c. During the following three months she gained four pounds and the urinary sugar decreased on a diet of C. 15, P. 45, F. 200. She became pregnant in November, and the sugar excretion soon after rose to 50 gm. although she maintained the same diet. During February and early March the sugar output increased up to 100 gm., with large amounts of acetone, and her weight fell to 108 pounds. Clinical symptoms of acidosis did not appear, and the CO_2 combining power of the plasma never fell below 44 volume per cent.

Insulin injections, (Iletin, Lilly, II-20), were commenced on March 19, and she has received two or more injections daily, with an occasional omission, ever since. From 10 units twice daily the dose was gradually increased to 25 units twice a day on June 16. The sugar excretion varied between 10 and 50 gm. in twenty-four hours during this period. On July 25 on a diet of C. 40, P. 54, F. 160, there was 1.66 per cent of sugar in 2460 c.c. of urine, 44 gm. The body weight was then 142 pounds, blood sugar 250 mg. per 100 c.c. The Iletin was increased to 30 units twice daily.

The patient was admitted to the Sloane Hospital in labor at 6 A. M. of July 27. (Table III.) The fetal heart could not be heard, and the resident physician, Dr. Findley, stated that hydramnios was probably present. At 10 A. M. the blood sugar was 312, CO_2 38. The cervix was then two fingers dilated. Following an attack of vomiting, with drowsiness and moderate hyperpnea, 300 c.c. of 10 per cent glucose solution with 45 units of Iletin were given intravenously at noon. At 2 P. M. the blood sugar was 245, the CO_2 had dropped to 28. At 4:30 she was given 20 units of Iletin subcutaneously and milk with glucose by mouth. At 6:30 P. M. she was delivered breech presentation, of a stillborn premature female infant, which was 57 cm. long and weighed 1900 gm. The cord was not pulsating, and there was some indication that there had been premature separation of the placenta. At 8:30 P. M. 20 units of Iletin were given subcutaneously. At 10 P. M. the blood sugar had increased to 465, and the CO_2 was still 28. Additional 20 unit doses of Iletin were given at 12:30 A. M. and 6:30 A. M. on the 28th. At 10 A. M. the blood sugar was 260, and the CO_2 had risen to 48. It was palpably evident that the patient was on the verge of coma during the last few hours of labor and the first twelve hours postpartum, and she would undoubtedly have succumbed to it if insulin had not been available.

She remained in the hospital for 12 days postpartum with the available COH in the diet, (COH plus 58 per cent of the protein) between 36 and 57 gm. and 30

TABLE III

	DIET			TOTAL CALORIES	TOTAL AVAILABLE C.O.H.	URINE		C.O.H. BALANCE		INSULIN		MG.		
	C.O.H. GM.	PROTEIN GM.	FAT GM.			GLUCOSE GM.	DIAGNOSTIC	NEGATIVE	POSITIVE	UNITS PER DAY	HOW GIVEN	BLOOD SUGAR	PLASMA CO ₂ VOL. %	PLASMA CALCIUM
July 27														
10: A.M.	..	..	..	..	..	1.2%	++	....	..	..	..	312.	38.	9.9
12: Noon	30	..	..	120	30	....	....	....	..	..	45.	...	..	..
2: P.M.	..	..	..	..	..	1.8%	++	....	..	..	..	245	28.	9.8
4:30 P.M.	24	7	8	196	28	....	....	....	..	..	20.	...	..	..
6: P.M.	24	7	8	196	28	....	....	....	..	..	..	...	..	..
10: P.M.	24	7	8	196	28	....	....	....	..	..	20.	465	28.	9.9
July 27	102	21	24	708	114	24 gm.	++	....	90	85	..			Total for day
July 28	72	39	52	912	79	11 "	0	....	68	70	20	260	47.5	..
July 29	37	33	65	865	56	7	0	....	49	60	30 bid	235.	..	..
July 30	25	48	60	832	62	5	0	....	57	60	30 bid		..	
July 31	42	30	64	860	60	5	0	....	55	60	30 bid		..	
Aug. 1	30	42	60	860	54	4.5	0	....	50	60	30 bid	334.	..	9.6
Aug. 2	36	38	65	881	58	0	0	....	58	60	30 bid			3 hours after breakfast
Aug. 3	35	49	90	1146	64	0	0	....	64	60	30 bid			
Aug. 4	35	50	90	1150	64	0	0	....	64	60	30 bid			
Aug. 5	35	50	90	1150	64	0	Trace	....	64	60	30 bid			
Aug. 6	50	45	90	1190	76	Trace	F. T.	....	76	40	20 bid	166.	..	10.5
Aug. 7	48	52	80	1120	78	0	V. F. T.	....	78	40	20 bid			5 hours post insulin
Aug. 8	58	53	90	1254	89	14.9	0	....	74	40	20 bid			
Aug. 9	50	53	84	1168	81	6.1	F. T.	....	75	40	20 bid			
Aug. 10	50	53	84	1186	81	0	0	....	81	40	20 bid	415	53.	10.5
														14 hours after last insulin in- jection

units of Iletin given twice daily. Four days before discharge the urine was sugar-free, but on an intake of only 880 calories, (C. 25, P. 40, F. 60.) Two days before discharge with the Iletin reduced to 20 units twice daily, 15 gm. of glucose were excreted. Since leaving the hospital on August 11 her carbohydrate tolerance has progressively decreased. In the sixth month of pregnancy, (May 14) she had a positive carbohydrate balance of 44 gm. on 30 units of Iletin, H-20 strength, available COH 54. On December 7, four and one-half months postpartum, there was a positive balance of 10 gm. on 60 units of H-20 Iletin, (the equivalent of 85 units of the H strength), available COH 40.

The fetal autopsy revealed certain findings in the pancreas of questionable significance. The gland was normal to gross examination. Microscopic examination showed that the glandular structures were surrounded by an edematous net-work of connective tissue. Some of the islands of Langerhans were larger than normal and their cells markedly edematous. Other islands appeared normal. There was no evidence of the hydropic degeneration typical of pancreatic diabetes.

The local tissue reaction to the Iletin injections was more severe in this patient during her pregnancy than it has been postpartum. She objected to increasing the number of injections beyond two a day, and to increasing the size of the individual dose. It is possible that if she had been hospitalized during the last two months of her pregnant term and the larger amount of insulin given which was at times indicated, a living child might have been secured. But it is unlikely that the evident effect of the pregnancy in decreasing the patient's tolerance would have been modified.

The strain imposed by pregnancy upon the general metabolism and upon the endocrine glands is especially severe upon the damaged pancreas of the diabetic, and its effect can apparently not be warded off by insulin. Accordingly, the moderately severe or severe diabetic should be prevented from incurring the risk of a pregnancy, and if pregnant an early interruption is indicated.

140 WEST SEVENTY-NINTH STREET.

Society Transactions

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SIXTH ANNUAL MEETING

PHILADELPHIA, PA., SEPTEMBER 19-21, 1923

(Continued from May issue.)

DR. EDWARD SPEIDEL and DR. HENRY H. TURNER, Louisville, Ky., presented a paper entitled **The Roentgen Ray Diagnosis of Normal and Abnormal Pregnancies**. (For original article see page 697.)

DISCUSSION

DR. FRANCIS REDER, St. Louis, Mo.—A young lady, twenty-five years of age, unmarried, was in the hospital under the care of a physician. I was asked to perform an operation for the removal of an ovarian cyst. The physician was well known to me. Whether or not he was ignorant of the true condition I do not know. The examination I made was not satisfactory to me. Certain findings aroused my suspicion. I asked that an x-ray picture be taken. The doctor asked, "Why an x-ray picture?" I told him that I would like to know whether or not this was a dermoid cyst. The x-ray picture disclosed a twin pregnancy at about the fourth month.

DR. BURNLEY LANKFORD, NORFOLK, VA.—Dr. Speidel has brought to our attention another method of diagnosis. We can usually make a diagnosis after the cessation of menstruation clinically. There is a certain proportion of cases in which we cannot make a diagnosis, and it is well to draw attention to the value of the x-ray in these cases, and I would like to know how much help we are able to obtain in regard to the question of the postmature fetus when the measurements are apparently normal.

DR. DAVID HADDEN, OAKLAND, CALIF.—My experience with the x-ray in the diagnosis of pregnancy has been unfortunate. In the first six or seven cases sent to a roentgenologist, abortion occurred or labor started within twenty-four to forty-eight hours, but whether due to the dosage or not, I do not know. I have given up the x-ray as an aid to the diagnosis of pregnancy.

DR. SPEIDEL (closing).—The point brought out by Dr. Hadden is an important one and should be considered. In more than 300 x-rays that we have made we have had no accidents of any kind. The picture I showed you here of a dead fetus was not one of those that had been x-rayed previously. The point seems to be this: A slight exposure is necessary in making an x-ray of a fetus. Again, pneumoperitoneum is not injurious to the fetus or to the mother's sexual capacity and should not be confounded with x-ray radiation which is used in the treatment of pelvic conditions. The exposure in the latter is more frequent and longer. In 300 pneumoperitoneums Dr. Turner reports never having had an accident of any kind.

In answer to Dr. Lankford, we have not studied the x-ray in postmature cases because the data we get in our City Hospital are so unreliable that we cannot tell whether the child is postmature or not.

DR. E. P. SLOAN, Bloomington, Ill., presented a paper entitled **Radical Surgical Treatment of Procidentia**. (For original article see page 703.)

DISCUSSION

DR. M. P. RUCKER, RICHMOND, VA.—Dr. Sloan mentioned the fact that the question of subsequent pregnancies ought to be considered when we do one of these radical suspension operations. I recently saw a case of pregnancy in which a Murphy operation had been done, and the case presented a curious picture. She had had several pregnancies, each time having had lacerations, and at the last labor the repair work had broken down. The doctor in the case had just returned from Chicago, and in his desperation did the Murphy operation, hulling out the endometrium and stitching the two halves of the uterus in front of the recti muscles as described. The woman became pregnant and when I saw her she was about six months' pregnant. The fetal heart sounds could be heard distinctly. She went along another month after that, and the doctor was afraid she would have a skin rupture, so he split the skin and removed the premature baby which lived two or three days.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—In treating most of these cases of procidentia uteri I have followed the plan of doing the Gilliam operation in child-bearing women, with repair of the pelvic floor. On the other hand, in women past the menopause, I have resorted to the Watkins interposition operation with repair of the pelvic floor. Those cases in which a previous hysterectomy has been made and there is complete procidentia of the vagina and a pelvic hernia, are very trying, and I was interested in the clear description the essayist gave as to the management of these cases.

DR. HENRY SCHMITZ, CHICAGO, ILL.—We all realize that the chief cause of prolapse of the uterus and vagina is a defect in the muscular pelvic diaphragm, especially the pubococcygeal portion of the levator ani muscles, causing loss of support to the structures lying above it. Descent and finally complete prolapse are the inevitable result.

The principles of the surgical treatment are: A uterus in retroversion easily prolapses. The levator ani muscles must be dissected and coaptated by suture to reestablish normal support of the organs lying above it. The nearer we can reestablish normal anatomic relations, the better will be the result of surgical treatment.

The cases should be divided into three groups: (1) Patients who are still in the childbearing period and desire offspring. In these we perform one of the modifications of the Gilliam operation and do a levator ani muscle suture with a posterior colporrhaphy. (2) Patients who have prolapse but are in the postmenopausal period of life. In these we perform a Watkins-Wertheim interposition operation and a levator ani muscle suture. (3) Patients who have practically a total atrophy of the muscles of the pelvic floor. In these we resect the vagina leaving a small canal behind for the purpose of drainage, but otherwise attach bladder to rectum and narrow the vaginal outlet as much as possible. I mention these procedures not to take away any of the credit or merit of Dr. Sloan's operation. But we have followed these simple procedures and have been well satisfied with them.

DR. FREDERICK S. WETHERELL, SYRACUSE, N. Y.—That method which is best suited to the individual operator, the one which gives him the best results is the method he is likely to use. In a recent article in *Surgery, Gynecology and*

Obstetrics, Graves speaks of doing the Oldhausen operation, using silk sutures, and claims to get brilliant results in cases of procidentia, by using that simple method. The simpler the technic, providing the final result is permanent, the better is the method.

DR. HERBERT W. HEWITT, DETROIT, MICH.—If I understood the author of this paper correctly, this operation was devised for patients at or near the menopause. That would exclude cases in which operations, like the Ferguson and Gilliam, might be considered. Dr. Sloan spoke of the Murphy operation. I have been doing in Detroit a modification of the Murphy operation which has been satisfactory and is simpler than the latter. Murphy split the uterus. In the modification operation I do not split the uterus. These patients are usually fat women and their uteri are small. This operation must be done in selected cases. Where the uterus is small and does not need to be resected, I grasp the organ, apply forceps to the broad ligament, and cut right down to the cervicocorporeal junction. I do not remove the ovaries or tubes, but sew the cut edges of the broad ligament down to the cervicocorporeal junction on each side. I bring up the uterus, sew the peritoneum around the cervicocorporeal junction, sew the rectus muscle to the corpus and suture the fascia over the fundus.

I have done fifty operations by this method and have been able to trace most of them. I have had but one recurrence, and this was in a patient who had a pre-existing ventral hernia. The operation should not have been done in this case, or in any case where the abdominal muscles are not in good apposition. One of my associates has operated on something over 100 cases by this method and has not had a single recurrence, and aside from the one case I mentioned I have had no recurrences.

DR. F. A. CLELAND, TORONTO, ONT.—There are many types of operation dealing with cases of procidentia, and operations like the Graves type are satisfactory. I have seen Graves perform the operation, and he showed a number of postoperative cases. His results were excellent. The operation I have done principally for these cases of complete prolapse in old women is a modification of the Mayo technic. The only objection to the Mayo method is that insufficient attention is paid to the cystocele which usually accompanies these cases. By doing a radical operation on the cystocele like a radical hernia operation, approximating the pubovesical fascia, after doing a vaginal hysterectomy, and carefully attaching the round and broad ligaments to the walls of the vagina, the results in my cases have been eminently satisfactory.

DR. SLOAN (closing).—The operation I have described is not designed for the minor degrees of procidentia. If the pelvic diaphragm is not elongated and cone-shaped downward, you cannot bring the cervix up to the point at which you can anchor it. There are some old curved elevators still in existence with a handle and a knob on the other end. They are of assistance in these cases. After making an incision through the vaginal vault and putting the knob in the incision the assistant can manipulate the handle and give more aid than has been possible by any other means. The cutting of the broad ligament is a part of the Collins technic. Leaving the round ligament is our technic. The objection to cutting the broad ligament is merely destruction of a portion of the ovarian circulation and destruction of some of the blood supply to the flaps.

Dr. Hewitt spoke of ventral hernia. There is nothing that I know of that is of as much assistance in taking care of a low ventral hernia as the Jackson operation. The two horns of the uterus hold the recti muscles together. He spoke of leaving the body of the uterus. That was done in the old Kocher operation.

The point I tried to make was that in the Jackson and Collins operations we have the uterine stump completely invested with peritoneum, and the peritoneum is

a barrier against extension of infection from the cervical canal into the abdominal wall. The Collins operation gives patients more comfort than any operation that we have tried, the Jackson operation is followed by some pain for a few weeks. The Collins operation is as easy to perform as an appendectomy. Nearly all work is done outside the abdominal cavity, and the results are permanent.

We do not advocate these operations in all cases. Out of 1643 hysterectomies, we have done the Jackson and Collins and Murphy operations only 63 times, making less than 10 per cent. The comfort experienced following the Collins operation is much greater than that following any other operations.

DR. W. WAYNE BABCOCK, Philadelphia, Pa., read a paper entitled **Chemical Hysterectomy**. (For original article see page 693.)

DISCUSSION

DR. AARON B. MILLER, SYRACUSE, N. Y.—I presume that if you should call on Dr. Ill and some of those who are familiar with the ancient history of gynecology, they will tell you they lived through the period of treating the cavity of the uterus with chloride of zinc, when cancer was present in the cervix. Dr. VandeWarker and Dr. Goodell were among the first to institute this line of treatment, and you will find an article in the early volumes of the American Gynecological Society, bearing on this subject. It is interesting to see how a line of treatment of this character can develop, after a long period of time has passed. In the early history of the malignancies, before we had at our command the present modern methods of treating them, or of attempting to cure them, this treatment afforded a great amount of relief to patients with malignant disease of the uterus. The methods which Dr. Babcock has suggested were the methods which were in vogue at that time, and I wish to corroborate what he has said in regard to the after-results. Neutralizing the vagina, and preventing injuries to it, tampons, saturated with a solution of sodium bicarbonate, were placed in the vaginal vault, to prevent the action of the solution of chloride of zinc, which was carried into the cervix on tampons or gauze. Where the malignancy was advanced, the necrotic tissue was curetted away, and the tags of tissue remaining were burned away by the actual cautery or removed by the scissors. Often the malignancy had extended to the vaginal walls anteriorly or posteriorly, about the bladder or rectum. There was little fear the treatment would do harm to these contiguous parts.

The point I wish to emphasize is this, that after packing the uterus with gauze saturated with this solution, it was permitted to remain from seven to ten days before its removal, after which the cast was thrown off leaving the parts clean to the eye. In some instances we got hernias, and had discharges from the bladder and rectum. In most cases, the discharges ceased, and the openings to these organs closed by granulation. At that time, we did not know the chemical action of this solution, as we do today, but after sterilizing the parts we did get a healing process, and the immediate symptoms were overcome. In many instances, the patients returned to their homes, and remained well for an indefinite period, free from discharges and odors. The impression went out following this treatment, that the doctor had been mistaken in his diagnosis, that these patients were not suffering from malignant disease. Others received the same treatment and have gotten well. Discharges were no longer present, odors were overcome, and the treatment was both salutary to the physician and patient, and it was a method in those days that offered much in the way of relief.

DR. FREDERICK S. WETHERELL, SYRACUSE, N. Y.—I would recommend to the members that they study the technic of Dr. Babcock very carefully and also his mathematical calculations, before using zinc chloride. During the war or rather after it, during the cleaning up period, when we had so many hundreds of bone infections to deal with, I knew of two or three unfortunate occurrences following the use of zinc chloride in the injection of bone sinuses. Unfortunately a surgeon did not carefully read or understand the technic, and two or three cases when almost ready to go home, were taken to the operating room, injected, and promptly died on the table because this surgeon had not first applied a tourniquet above the point of injection. The cases should be carefully selected.

DR. HERBERT W. HEWITT, DETROIT, MICH.—I want to ask Dr. Babcock three questions. First, what are the indications for doing this operation? Second, has he ever had any trouble with hemorrhage following this packing? Third, whether there is any chance of the zinc chloride penetrating the peritoneum and getting into the peritoneal cavity?

DR. JAMES E. DAVIS, DETROIT, MICH.—I would like to ask if this procedure can produce thrombosis and embolism.

DR. BABCOCK (closing).—I am glad Dr. Miller has referred to this early use of zinc chloride for carcinoma of the uterus. It is evident that Dr. Goodell popularized and perhaps modified, but did not originate the method. Of course, we are not at this time advocating the treatment for cancer.

In answer to Dr. Hewitt: The method is to be used when we have no safer or more effectual measure available to combat uterine hemorrhage, infection or fertility. For example, a recent patient was a girl with advanced pulmonary tuberculosis associated with draining uterine hemorrhages. Her pulmonary disease was so far advanced, that pregnancy would have been most hazardous, and the operation was adopted to stop the bleeding and insure sterility. Another patient, obese and not a good operative risk was not in condition after a gall-bladder operation to withstand an added abdominal hysterectomy. Chemical hysterectomy, in this case, enabled the patient to escape a second dangerous operation and the surgeon a difficult hysterectomy. A patient, now in the hospital has had recurrent uterine bleeding following an old gonorrheal infection. She has had one abdominal operation on the appendages and has been eurented twice without relief. She objected to another abdominal operation, but readily accepted the chemical measure.

For the mentally defective girl so subject to venereal infection and pregnancy I know of no better prophylactic measure than chemical hysterectomy.

As to the second question, I have seen no alarming hemorrhage following the operation, although in one patient there was sufficient oozing to justify a secondary vaginal packing. Unless one perforates the uterus or is very careless I do not think there is danger of a serious chemical peritonitis, and surely if the danger had been great it would have followed the caustic treatment of cancer of the uterus, where the uterus is often greatly thinned by scraping away the malignant tissue.

Zinc chloride is a powerful antiseptic that also coagulates and seals the lymph channels with which it comes in contact. The absence of sepsis is shown by the slight temperature reaction after the operation and the slight odor to the vaginal reaction and slough.

In reply to Dr. Davis: I know of no case of thrombosis or embolism to follow the use of zinc chloride in the uterus. I am glad that Dr. Wetherill has mentioned the possibility of death from chloride of zinc. In our use of zinc chloride to

sterilize old sinuses from wounds of war, we found that the chloride was quickly converted into an innocuous carbonate or oxide of zinc by the blood. But from a pressure injection into sinuses, erosion into capillaries and entrance of the chloride into the blood stream might occur with sudden death. This occurs only when a strong solution is injected under pressure. Even when injected into an artery or vein, the chloride will be quickly neutralized and no general harm caused, if the circulation be assisted by a tourniquet for from two to five minutes. Obviously, this danger does not apply in chemical hysterectomy, for no forcible injection is used.

NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 8, 1924

DR. FRANKLIN A. DORMAN IN THE CHAIR

DR. OTTO R. EICHEL, Albany, N. Y., (by invitation) presented a paper entitled **A Preliminary Report of a Statistical Study of Puerperal Sepsis.** (For original article see page 667.)

DISCUSSION

DR. FRANKLIN A. DORMAN.—The thought that impresses me is the tremendous burden obstetricians have to carry in the present registration of puerperal sepsis or maternal mortality. It has always seemed to me that a woman should not be taught the hazard that childbirth represents any such figures as these when you see the enormous incorporation of abortions and miscarriages that occur before the child has any chance of viability, and which is probably a much larger percentage than the doctor is able to demonstrate here and is probably criminal in nature.

DR. HAROLD BAILEY.—As I am reading the next paper I did not intend to speak now but I feel that there is something in what I am going to present that may possibly throw some light on this problem, especially from the angle that Dr. Eichel has taken.

I am reporting in my paper sixteen cases of sepsis. Of these cases fourteen occurred in Bellevue Hospital and two in the "School for Midwives." They were all entirely under my care and that of my staff. All but two of these women had nonoperative deliveries and there were no rectal or vaginal examinations. It is our custom to permit these examinations only in cases of delayed or difficult labor. Therefore it would appear that the infection did not occur at the time of delivery and the question arises as to whether it was of antogenous origin or due to droplet infection during the postpartum period.

I refer a number of times to Dr. Eichel in my paper because to me his work has been most interesting. In particular I wish to mention one of his charts where the death rate from all puerperal causes, during the period 1916 to 1920, rose sharply 15 to 16 points both in the State and in the registration area of the United States, and yet with this sharp rise the puerperal septicemia rate runs along on the same level. If, as is usual, 30 per cent of the deaths were due to sepsis there should be an accompanying rise in this rate. For comparison we might turn to the rise in the puerperal sepsis following the epidemic of influenza in 1889 to 1890. In 1889 Lea's chart shows that the puerperal death rate from

sepsis was 2.2 per cent and that in the following years, 1890 to 1895, it rose from 2.2 to 3.3 per cent. Stated in figures this increase seems small, but it makes a noticeable rise in any chart and it seems to me that it corresponds with the increase with which we are now dealing.

DR. FREDERIC C. HOLDEN.—Will Dr. Eichel tell us in closing if he has any statistics or any data to indicate why they have such a low death rate in Birmingham?

DR. H. C. COE.—I could not help, when listening to this paper, going back forty years to the period when I spent a good deal of time in the obstetric wards of the Vienna Krankenhaus. I can distinctly recall that we had no epidemic of puerperal fever during that year and but few deaths following labor. At that time we were taught to wash our hands carefully. Midwives then were highly trained; in fact, we learned more from them than we did from the professors. They saw that we scrubbed our hands thoroughly and immersed them in strong permanganate of potash solution, and then a solution of oxalic acid. Every student who took charge of a labor case wrote his name on a board at the head of the bed and was held directly responsible for the case from start to finish. When I came back to New York I was connected at different times with the Infant Asylum, New York Maternity Hospital, and later with the Foundling Hospital. At that time I had a large private practice and I recall that there were few deaths from puerperal sepsis, though many cases of infection. Why is this? I cannot explain it, especially as students are now so carefully trained in aseptic technic and wear rubber gloves. I do not see why with the careful training we give our medical students and with the extreme care used in hospitals, we cannot stamp out puerperal sepsis in the same way in which we have practically eliminated diphtheria, the death rate from which, when I was in the Harvard Medical School in 1888, was 30 per cent.

DR. HIRAM N. VINEBERG.—I can recall distinctly having read a few years ago a paper which was published in one of the German journals, in which the question of autoinfection was discussed. There was a certain group of patients taken, thoroughly prepared, but not examined, and put in clean, aseptic sheets, and a test was made, with the result that a certain percentage of those cases had serious, in fact fatal infections, showing that autoinfection does occur, and that it cannot be entirely eliminated.

DR. GEORGE W. KOSMAK.—I think we are very much indebted to Dr. Eichel, who, as he has confessed, is not an obstetrician, yet has given us a paper that should furnish a great deal of thought to those of us who are practicing obstetricians.

A number of points he has brought out are extremely valuable. One of them has to do with the incidence of puerperal infection, and I think a great deal more should be done along those lines. The problem of the midwife he has discussed from the usual standpoint of the nonobstetrician, and the favorable light in which he has placed her, we, of course, have heard from a great many other sources. Nevertheless, I believe that at present we must continue to believe that the midwife is necessary, and although she may escape blame for a great many of these things, she is an institution which we trust will in time be eradicated.

There is one factor that I believe Dr. Eichel did not bring out sufficiently in his discussion and which was referred to by Dr. Bailey in his remarks, and that is the question of the apparently epidemic nature of these puerperal infections. There must be something to that idea because within very recent times we have witnessed in New York periods when infection occurred under circumstances

that apparently did not vary, as far as epidemics are concerned from those at other times. We are forced to conclude that certain cases of infection can be prevented, and there are others in which infection is unavoidable.

I do not believe we should be pessimistic at all insofar as the progress which has been made in preventing infections is concerned. On the other hand there are those unavoidable cases in which very little or no progress has been made. As Dr. Vineberg has said, cases can be confined under the most auspicious circumstances (we have all seen it) and yet these women become infected. There must be some factor there that we do not as yet understand. Some of our most serious cases occur in women who have a precipitate labor and in whom no examinations have been made and in whom no interference could be blamed for such a process. Then, again, a great many of these women present pelvic lesions that are undoubtedly lighted up during the labor and bring on this aftermath of fatalities. It is often a wonder to me why we do not have more infections. The great prevalence of gonorrhea at the present time, with its concomitant salpingitis, should lead to a great many more infections if there were not some natural protective agency on the part of the patient to prevent it.

The fact that so many of our large hospitals show such good rates insofar as sepsis is concerned, is undoubtedly an evidence of the contention that prevention can be made effective, and if there is one thing that should be disseminated by a society of this kind, and by the bureau over which Dr. Eichel presides, it is the dissemination of that truth; and while we do not want to cast aspersions on the other members of the profession practicing in the state, I think that those of us doing obstetrics are all witnesses to the fact that a great deal of carelessness is exercised by the average practitioner in the handling of his cases, and if these facts can be made plainly evident to these men a sense of responsibility must in time be aroused and an improvement in these rates result from the same.

I believe the Society is greatly indebted to Dr. Eichel for having brought the matter up from the standpoint of what I might call an outsider, and I am sure we will all take this lesson to heart and profit by it.

DR. OTTO R. EICHEL (closing).—We shall want suggestions from the obstetrician when we prepare our final report, especially in interpreting the figures.

I am very glad that your Chairman said what he did about education of the public, because it would be a great mistake to infer from this mass of statistics that pregnancy is a hazardous condition. The truth is that there were but 6,800 deaths in 1,250,000 deliveries, or a fatality of about one-half per cent from all causes, including criminal abortion,—so that pregnancy in itself is apparently not at all a hazardous experience.

When I spoke of educating the public, I referred, of course, to abortion, criminal or any other kind.

The point mentioned by Dr. Bailey as to there being no sepsis peak in 1918 is one of the outstanding remarkable things in connection with historical data on puerperal sepsis. I have no explanation to offer for it. Possibly when we make our final analysis and have all the associated causes of death, it will bring out the reasons.

One point must be considered in studying old data,—data of more than ten or fifteen years ago—and that is the practice of vital statisticians in editing the official death records. As you know, the practice is to have a preferred cause of death, that is, each death is attributed to one cause, which is regarded as the preferred cause—there being a guide for this, which is a standard preferential list. That brings about uniformity, because all edit in the same manner, but, unfortunately, it may give some statistics no scientific validity, because it may be

impossible to say which one of two or three diseases occurring together was the direct or most probable cause of death. The patient might have died of any one of the three. Statisticians who work scientifically can make up tables which show all the associated causes together, and that, of course, we shall try to do in our final tabulations of sepsis. The International List of Causes of Death has been revised three times and may have caused some differences. I cannot say offhand how it has affected sepsis. These revisions have affected tuberculosis and several other causes. The individual practice of the statistician would also have an effect on the data. He should always state precisely what he does, but many do not do that. For example, the official data for New York City (this is not said in a spirit of disparagement) for all puerperal deaths show no peak for 1918. Undoubtedly this is because whoever edited the causes excluded those which were associated with influenza and pneumonia. The standard practice is really to attribute them to the puerperal causes. So we have two sources of data for 1918 in New York City, and if you take those of the Census Office, you will find a very decided peak. There is no peak in the 1918 official data from New York City itself. This illustrates what I mean by editing.

Why the Birmingham rates are so low I do not know. We had Birmingham send us all the published material that they could on the city's maternal mortality, and it is my impression, upon looking it over, that they have done a great deal of work to control sepsis and other puerperal causes—both in the way of public health effort and in the medical profession, over a long period of time. This, plus the excellent training of the English midwives and their supervision taken together, may, I think, be the reasons for their low rates.

As to the epidemics of sepsis, that is an interesting point. Naturally, the same number of deaths would not occur precisely month after month or year after year. There would be a fluctuation, which is mathematically determinable and would fall within a certain range, and when it exceeds that range (the statistician may call it the standard deviation) must be due to some one or more causes operating which did not operate before. In other words, the rate from *all puerperal causes* when it runs to that high point in 1918 shows that something very unusual happened. In this instance we know it was the influenza pandemic—but it has not occurred in the sepsis rate since 1910 in New York City or in the rest of the State. Such a rise might be evident if the rates were shown by days or weeks. However, we have not done that. We may try it later, to determine if real epidemics of sepsis did occur. It may happen that there is a run of cases in a certain section of a community. But it might not be sufficient to make the whole rate go up, and possibly the actual increase may be no more than might occur as a matter of chance.

DR. HAROLD BAILEY read a paper entitled **The Serum Treatment of Puerperal Sepsis.** (For original article see page 658.)

DISCUSSION

DR. FRANK HUNTOON (by invitation).—Perhaps you would be interested in knowing something of the laboratory end of this problem in the preparation of an antistreptococcus serum, that would be efficacious in the treatment of this condition.

About five years ago I became interested in this subject, and being a laboratory man, naturally attacked the laboratory end, first from the standpoint of certain improvements in the methods of the immunization of horses. The value of the

serum as measured by laboratory tests was very greatly increased, so much so that we voluntarily increased our own standard threefold. The serum is controlled in part by the Government, it is licensed, but they do not require Government standards on the test.

At the time when we succeeded in increasing the value of the serum over the older sera threefold and in many cases eight times, we became more interested in it; then we began to look up the literature and found very little; that is, there were no collected statistics on properly worked-out cases showing whether polyvalent antistreptococcic serum was therapeutically of any value or not. That was discounting the previous work with the monovalent serum, which evidently was not valid. The problem was to obtain a properly polyvalent serum. The assumption had been previously made that practically all streptococcic strains were different from each other, and that the only way to obtain a sufficiently polyvalent serum was to inject into the horses a large number of different strains. We started with thirty-five different strains. This was very hard on the horses.

During the last eight or ten years at Glenolden, constant work has been under way on the problem of classifying the strains of streptococcus. Two serologic classifications of human streptococci have been brought out, dividing them roughly into four groups; those of Haven and of Dochez. We obtained representatives of all these groups, checked them up with our own, and finally succeeded in classifying hemolytic streptococci from human sources roughly into eight serologic groups. So by taking members of each group we could then inject eight strains into the horses and produce serum that was as polyvalent as when we injected the thirty-five strains. This was much handier from the production standpoint, and it was also easier on the horses.

When it was found there were no adequate statistics, our director gave permission to go out to get the statistics if it were possible.

Owing to the small number of cases in any one institution, it was found necessary to furnish the serum to as many men as possible and try to collect the statistics afterwards. In order that there would be no commercialism about it, we went to the various men and offered to have any one person they selected collect the statistics and publish them, good, bad or indifferent, so that our part would be merely to furnish the serum.

This report tonight is the first fruits of that work, which was started three years ago. Now, it is very evident that, from the statistical standpoint, in the endeavor to find out whether this serum cures puerperal sepsis or not, most of these cases that were shown tonight are valueless, for the reason that the laboratory work was faulty. I have no doubt that all these cases had streptococci in the blood at one time or another, but they did not find it, and if they did not find it, we cannot use the cases as far as the final determination of the value of the serum is concerned.

One thing brought up tonight was the question of sepsis. Now, what is sepsis? Nobody has defined what it is. Is it a septicemia, or is it a bacteremia where there is a leakage from some point into the blood with only a few microorganisms, or is it a local condition where toxins are being absorbed into the blood? This question must be decided. Some definition must be determined upon by you gentlemen. The laboratory men cannot make it because you will not accept it, but we are perfectly willing to accept your definition of it.

You may not know that antistreptococcic serum is very widely used, and I suspect, as Dr. Bailey said, that it is used in many cases only as a last resort. One thing is evident from Dr. Bailey's tabulations, and that is he did not use the serum early enough. He waited too long before starting. With antibacterial

serum we have to use it early and in large quantities and then stop. It is exactly the same sort of a proposition as we have with diphtheria. None of you would wait until after the third day to treat a case of diphtheria with antitoxin, and the same thing holds true here. If you wait until the streptococcus has become accustomed to its environment and has gone ahead and is becoming more virulent and the resistance of the patient is dropping, the serum will not do any good. If you use serum early, when the resistance of the patient is still high and he can still furnish leucocytes, you can do some good because all the evidence at hand shows that the antistreptococcal serum works by increasing the opsonic power of the blood.

There is another point which comes up here and that is that antistreptococcal serum injected into the blood stream will at times take care of the bacterial infection in the blood, but will not take care of the local condition, and it is very evident why that is so, because of the manner in which it works. It increases the opsonic power of the blood, so it will help to localize the condition. Gay showed recently that there are two kinds of immunity, a local and a general. The antistreptococcal serum furnishes a general immunity. The local lesion must be treated by other means, surgically, if possible, after full localization.

In regard to the question of the treatment of other streptococcal infections; as I said, there is very little in the literature about that. We get reports by word of mouth. Somebody here and there will have two or three cases and will tell us about them, but they will not publish them. Dr. John Eiman, of Philadelphia, had four cases of criminal abortion which were brought into the Presbyterian Hospital, all of them with hemolytic streptococci in the blood. They immediately received 300 c.c. of serum during the first twenty-four hours, 200 c.c. in the next twenty-four hours and then no more. The first three cases recovered promptly. The fourth case, which was moribund on admission, died.

It is true not only for antistreptococcal serum, but also for the other serums, such as antipneumococcal serum and perhaps what is better known, antimeningococcal serum, that statistics show the mortality goes up steadily for every day lost before the start of the serum treatment. It is reasonable and logical to believe that the earlier you get the antibodies working the better.

DR. J. MILTON MABBOTT.—I would like to ask Dr. Bailey whether in these cases he depended entirely on the serum treatment or gave any local attention to the intrauterine condition.

DR. GEORGE L. BRODHEAD.—A good many of these cases of sepsis that Dr. Bailey presented had no internal examinations. We see it frequently at the Harlem Hospital just as Dr. Bailey sees it at Bellevue Hospital. I am sure he intends this series of cases simply as a preliminary report. I think if Dr. Bailey could show us fourteen charts of patients at Bellevue Hospital they would show just as good results without serum as he has shown in this series with serum. The proof of the presence of bacteria in the blood has unfortunately not been demonstrated in any case, and I can see no good evidence that the injections of serum took care of the bacteremia. After several injections the temperature came down in a number of cases, but the parametritis went on, and that is what happens in a large number of cases without any serum at all. I would like to ask if he has any evidence to show that the injections helped the possible bacteremia in the blood, which was not demonstrated.

DR. BAILEY (closing).—If I may I will answer the last speaker first. If he can furnish us with a mortality list of severe cases similar to these, with either positive or negative blood cultures, and show a better percentage of cures I should

like very much to have it put in the literature. The only record that we have at present concerning the epidemic of 1920 to 1922 is the Lying-In Hospital report which shows a mortality of 62 per cent for streptococcus cases proved by blood cultures. We know, however, that there was a very high mortality rate in the cases of the preceding year. I hope that we will never be able to show anything like this again for we went through a severe and trying time.

I am informed that Wright of London, first vaccinates the donor in blood transfusions. In Berlin, Louros is using first serum and then autogenous vaccines. He thinks that the serum holds the patient until the vaccine can be used. Dr. Boldt tells me that there is no morbidity and no mortality following such major procedures as the Wertheim operation, when the patient has received this treatment before the operation. He also says that in the maternity clinics it is apparently a curative measure.

The committee of the American Gynecological Society in 1889 brought out one valuable point. Dr. Williams, who was on that committee, argued against intra-uterine manipulations. It took about ten years to have that advice disseminated in this country. I suppose that at the present time everyone who really practices obstetrics lets the uterus absolutely alone. I remember that in 1909 and 1910 we used to curette or carefully wipe out the uterus with a sponge stick to see whether there was any placenta remaining but this has been absolutely discontinued in our practice.

NEW YORK ACADEMY OF MEDICINE SECTION ON OBSTETRICS AND GYNECOLOGY

MEETING OF DECEMBER 27, 1923

DR. WILLIAM E. CALDWELL IN THE CHAIR

DR. ALFRED C. BECK read a paper entitled **The Conservative Treatment of Eclampsia**. (For original article see page 677.)

DR. EVERETT E. BUNZEL read a paper entitled **A Statistical Review of the Toxemias of Pregnancy**. (For original article see page 686.)

DISCUSSION

DR. ASA B. DAVIS.—I was asked to prepare statistics with reference to the treatment of toxemia of pregnancy in the Lying-In Hospital. The time allowed was entirely too short to make this complete.

Some of us have lived through various stages of the treatment of eclampsia, we have seen different methods of treatment brought forward from time to time that have promised very good results and then have proved to be disappointing. Some fifteen or twenty years ago, according to the reports of a certain group of men in and about Cincinnati, all that it was necessary to do in these cases was to give full doses of veratrum viride. This treatment was entirely disappointing in our experiences. We have seen at times a large number of eclamptic cases subject to almost routine treatment followed by a very low maternal mortality. So satisfactory did this appear that some of us began to arrive at the conclusion that we had reached a point where a method of treatment which was successful had been discovered, and then, with the same care and treatment the death rate would begin to increase. And so, we have harked back and forth and as yet have not arrived at a dependable method of treatment of eclampsia. There is no doubt, however,

that the incidence of toxemia of pregnancy and eclampsia at the present time is very much reduced. We hope and believe that this state of affairs is to be maintained and yet, with earlier experiences in mind, we sometimes wonder if we may not be swinging along the arc of a larger circle with greater radius.

Maternal mortality has greatly decreased; I doubt if this can be said of fetal mortality, because of the rather frequent onset of spontaneous premature labor.

I recall that ten or twelve years ago while in charge of half of the work at the Lying-In Hospital, I found a house surgeon who had every appearance of being about to break down from overwork. At the time, part of his work was the care of seven active cases of eclampsia. This was a larger number than usual, but at almost any time we could show examples of this condition. The same thing was true of practically every other service in the hospital. Our mortality and general results at that time probably did not differ very much from any other like institution. In contrast to this state of affairs, during the year 1922, in something over fifty-four hundred deliveries, there was one maternal death from the convulsive type of toxemia of pregnancy. A similar result is to be found in the records of 1923.

Years ago we gave morphine, but not in the large doses that are given today and we did not get results with the small doses. We did not venture to use large doses because we feared the morphine would tend to check kidney activity. I have seen better results in some cases when large doses of morphine have been given; but, that morphine treatment is to be the treatment of the future for all classes of cases of eclampsia, I doubt. I do not believe that when a patient is brought into the hospital with eclampsia we can merely give her routine doses of morphine and that such treatment will bring about the desired results. But, by careful, systematic observation of pregnant women and detecting the early symptoms of toxemia and deviations from normal, before the patient has reached the stage wherein she is desperately ill, I believe we are undoubtedly to make progress.

It is a number of years since I have performed a cesarean section for eclampsia. I resorted to this operation in some twenty-five cases in which I believed at the time that this was the best method of treating this condition. My recollection is that cesarean section gave results which compare favorably with those reported here tonight. In this group of twenty-five or more patients who were treated by cesarean section on account of eclampsia, a considerable number came under my care in subsequent pregnancies. It was a small group and I was able to follow them up. Some of these cases when they became pregnant showed signs of toxemia early and were sent at once to the hospital and subjected to treatment such as rest in bed and regulated diet. This eliminative treatment was carried out for a week or ten days. In the majority of cases one such internment, with the patient taking care of herself as to diet and general mode of life after leaving the hospital, was sufficient to carry them through to full term without pronounced evidence of toxemia and without eclamptic seizures in any case. Some of these patients would be required to come back two or three times during their pregnancy for rest and treatment for a week or ten days at a time. With the others, during their subsequent pregnancies, although they were under careful observation no sign of the symptoms of toxemia appeared. Hence, it does not follow that "once a case of toxemia—always a case of toxemia" is true. But it is true that such patients should be kept under very close observation in pregnancies subsequent to eclampsia.

There are undoubtedly two distinct types of toxemia of pregnancy. One, the so-called true toxemia of pregnancy which, although it may be severe, is transitory in character. The other is found in patients already handicapped by chronic nephritis; pregnancy adding its extra demands upon this latter type, not infrequently develops a toxemia which is rather akin to uremia. In the former type

in which visual disturbances appear, if the patient recovers, eyesight is restored quickly and completely. The temporary blindness which develops in these cases is almost invariably due to an edema which rapidly clears up as other symptoms subside. In the nephritic type the danger to eyesight is very much greater, because blindness in these cases is usually due to a hemorrhagic retinitis from which recovery is slow, and too often it leaves the patient partially or totally blind. These two types of cases are entitled to careful differentiation in considering the advisability of attempting to continue pregnancy.

As to the employment of phlebotomy in the treatment of eclampsia: This is no new departure. For many years we have used this procedure in certain cases, in some of whom the improvement was almost startling. The whole appearance of the patient would change decidedly for the better within an hour after the withdrawal of a large quantity of blood. We have seen patients having convulsions at short intervals subjected to this treatment; one or two convulsions might follow and then the patient would go on progressively to rapid recovery. It is a mistake to believe that every case of eclampsia should be thus treated, especially if it be before delivery has taken place. It must be evident that a large, robust, full-blooded woman can, under such circumstances, well afford a considerable loss of blood. This does not hold true if the patient is small, ill-nourished and anemic.

Notwithstanding what I have already said, I believe that substantial and surprising progress has been made during the last five years at least towards the elimination of serious toxemia of pregnancy in the majority of well conducted maternities. This is certainly true in the Lying-In Hospital service. Where formerly these cases in considerable numbers were in the hospital at almost any time, now, they are so rare that our interne staff and pupils can gain no adequate idea of the possibilities of such cases.

This state of affairs has been brought about, I believe, by systematic antepartum observation and instruction, coupled with the willing and more intelligent co-operation on the part of the patients themselves in carrying out the idea that the time to treat eclampsia is long before it occurs. It is our well founded belief that the emergency obstetric case should disappear and that then the many complications and deaths will likewise disappear, or at least be greatly diminished.

DR. FRANKLIN A. DORMAN.—The only way we can get anywhere is by collecting data and analyzing them. At the Woman's Hospital almost all our cases have had antepartum care and among these patients eclampsia is exceedingly rare. We occasionally get an emergency case.

I should like to ask Dr. Beck whether morphine was given to the other cases of toxemia.

I want to make a plea for the treatment of the toxemic baby. There are a certain number of babies that are eclampsia poisoned. These babies breathe badly and have cyanotic attacks. If we get them in time and flush them with saline they may survive. It seems to me that some of the infant deaths which have been recorded in the tables as unexplained may have been due to toxemia.

I was also interested in the follow-up and the repetition of pregnancy. A few years ago I would have said that if a woman had had two pregnancies with severe toxemia she should not become pregnant, but I have seen some women of that class go through a subsequent pregnancy safely. In one patient some ten or twelve years ago I induced premature labor. She again became pregnant and we made an effort to save the second pregnancy, but I induced abortion for severe early toxic symptoms. Later this woman again became pregnant and delivered herself like any normal woman and, without any trouble, though her history should have precluded the possibility of her having a child. Another patient had a high blood pressure and we

tried to carry her toward term, but within two weeks of term the blood pressure rose rather sharply and the woman went into labor and lost her baby from a separation of the placenta. I had rather a hard time in pulling her through, yet that woman a couple of weeks ago had a perfectly healthy baby. So it seems that a woman who has had high blood pressure and has been treated for toxemia of pregnancy should not necessarily be doomed to childlessness because of one or two such experiences.

I recall a paper read forty years ago in which the author claimed that cases of eclampsia could be cleared up by *veratrum viride*. He was probably perfectly honest and obtained the results which he reported. Perhaps when it was the fashion to do phlebotomy, the procedure gave good results in eclampsia. The point which we must remember is that we must not go too far with the swing of the pendulum, nor must we allow ourselves to be so much influenced by statistics that we will go on treating a toxemia even after we recognize that we are waging a losing fight, and when by inducing labor we might have saved the patient. There is no question but that we have learned a great deal about the advantages of delay and that in eclampsia we should avoid irritations. We used to be told to load these patients with chloroform to keep them from having convulsions, but now we know that it is better to allow them to have a convulsion than to load them with poison.

DR. EDWIN G. LANGROCK.—My statistics are from the Harlem Hospital. Up to April, 1917, there were 34 cases of eclampsia with 12 deaths, a mortality of 35 per cent. One died after three hours, one after four hours and one after seven hours. Six were multiparae and six primiparae, which showed that 28 per cent of deaths occurred among primiparae. Beginning in April, 1917, eclamptic patients were not only given intensive medical treatment but in addition induction of labor was a routine measure. Since then we have had 57 patients, with 13 deaths, a maternal mortality of 23 per cent. The lower maternal mortality in this series as compared with the 35 per cent in the former series we attribute to the more intensive medical treatment, plus induction of labor. The fetal mortality was 65 per cent.

Recently after reviewing the work of Smilie, Tweedy and Stroganoff, Dr. Brodhead decided to try the Rotunda method of treatment, giving repeated gastric lavages, colon irrigations, turning the patient on the side, infusions, etc. Nine patients were treated in this way, six primiparae and three multiparae. Of the primiparae, three died, a maternal mortality of 33½ per cent. In our hands the Rotunda method has given very poor results. Our records show 55 cases of postpartum eclampsia with eight deaths, a maternal mortality of 14 per cent.

We cannot lay down a routine for all cases. We may get one case which will do better by Dr. Bunzel's method and another which will do better by Dr. Beck's treatment, and again we get a patient who will do better with the induction of labor. We give intensive medical treatment occasionally and induce labor when that is indicated, but we also always induce labor with the bag and bougie; cesarean section is never done for eclampsia *per se*, but only when there are other indications, as contracted pelvis, etc.

DR. JOHN O. POLAK.—Dr. Bunzel brings out what to me is the keynote of the whole proposition. There was a time when I bragged that I had never had a case of eclampsia, occurring in my prenatal cases. About two years ago the calamity occurred. It taught me that one should never allow a patient with toxemia to go out from the hospital without inducing or delivering her. I had a preeclamptic who improved and I allowed her to go out; she came back later with a blood pressure of 200, but she had not had a convulsion. She had had a previous cesarean section. I performed cesarean section and she died in shock, from a drop in pres-

sure of over 100. Dr. Bailey has called attention to the results of cesarean section in some toxemic cases followed by reduction in the blood pressure. In ordinary cesarean sections there is not much fall in the blood pressure, but in cases of toxemia there is a fall. This patient had a blood pressure of 200 and as a result of the operation it dropped to 80.

I feel with Dr. Davis that after having been through these things for 30 years and having seen the pendulum swing back and forth several times, we should not become too enthusiastic over new methods. I recall remarkable results in a series of cases treated with *veratrum viride* while working with the late Dr. Jewett. Then I began to treat patients in this way alone and they died. However, I have been impressed with the few cases I have seen and the cases that have come into the service, that the coincident use of morphine and phlebotomy is very effective, but we have all had 15 or 20 cases run along without a death and then have had the misfortune to lose five or six patients in succession. To my mind the real point brought out tonight is that the antepartum care that is given in our clinics is making a vast reduction in the number of cases of eclampsia. Among 7,000 cases receiving such care there was but one case of eclampsia. While we all feel that the uterus ought to be emptied, as that is the only source of the toxemia, we all feel also that the toxemic patient is an extremely bad surgical risk and that anything that holds out the hope of avoiding operation ought to be tried. That is the reason we are trying morphine and the withdrawal of blood and the prevention of external stimuli.

DR. W. W. HERRICK.—I have been interested in this subject from the standpoint of internal medicine, and I have also been fortunate enough to have observed a considerable number of Dr. Bunzel's cases. There is one series of statistics that we shall have to gather before we can begin to draw conclusions in regard to these toxemias. Were these women perfectly sound before undertaking pregnancy? I am inclined to think toxemia of pregnancy is the reaction of a woman who is in some way substandard to the strain of childbearing. For example, there are some women with substandard kidneys. Perhaps not more than five per cent of the toxemias are in this group. These have a definite retention of nitrogen, uric acid and of urea nitrogen in the blood. Such cases are very bad risks and subsequent pregnancies are likely to result in increasing difficulty.

Another type of woman often exhibiting toxemia presents an unstable cardiovascular system with actual or potential essential hypertension. These have hyperplasia without evidence of renal deficiency. Some of this group go on to cardiac insufficiency or to permanent hypertension. A few may have cardiovascular equilibrium restored after delivery. Other types of pregnancy toxemia are less definite in my own mind. In one, I believe focal infection plays an important part. Certainly the proper care of carious teeth, infected tonsils and similar infections seem to help in carrying certain patients with toxemia to term: it also seems to influence favorably the course of subsequent pregnancies.

A further type of woman frequently developing toxemia in pregnancy is one with a tendency to obesity. In this, errors in diet and particularly overeating, seem to play a part. In another vaguely defined group a disturbed endocrine balance is concerned.

In my own mind I am trying to separate these toxic cases into groups and types. Thus far only two types stand out distinctly; namely, the renal type, and the type with cardiovascular instability. To the internist, toxemia of pregnancy is interesting because it shows an organism in some way substandard and thus gives us a lead as to necessary management after delivery. This phase is revealed by the fact that among Dr. Bunzel's patients a considerable proportion showed some pathology,

such as albuminuria and retinal changes, one or two years after delivery. Such a finding favors the view that the toxemia of pregnancy is the reaction of a substandard female organism to the strain of pregnancy. It remains to establish the state of health in cases of this character before pregnancy. Only then will one chain of evidence approach completion.

DR. MEYER R. ROBINSON.—We have been taught, that edema and albuminuria constitute the main danger signals of an impending eclampsia. Zangemeister has even gone so far as to consider the retained water in the tissues as "the poison" responsible for the toxemia. More recent studies have completely controverted these teachings. In the countries afflicted with hunger during the late war, the number of persons with edema was very high, among them many pregnant women, and yet the number of eclampsias during this period decreased to a very small proportion. The blood pressure index forms by far the most reliable sign as to the degree of pregnancy toxemia present, for no case of eclampsia is free from a high blood pressure, while it may be free from edema and albuminuria. It is true, that the incidence of eclampsia rises in proportion as to whether or not it is associated with albuminuria and retention of water in the tissues, but this does not necessarily make every case of nephropathy and edema a potential eclamptic. There is sufficient clinical material extant to prove this contention. As clinicians, we must hence lay far greater weight upon high blood pressure, than upon the albumin in the urine or the edema. If phlebotomy has proved to be so valuable an aid in the treatment of eclampsia, is it not also logical to assume that spinal puncture would also help in still further diminishing the number of eclamptic convulsions and clear up the stupor and the coma by diminishing the intracranial pressure? I trust that this suggestion will be taken up and given a fair trial.

DR. FREDERICK W. RICE.—During the past two or three months we have been making a study of an analysis of about 170 cases of eclampsia from the records at Bellevue and at Manhattan Maternity Hospitals. It was interesting to see frequently a series of twenty to thirty cases of eclampsia which would all show mild symptoms and again a series of cases with very severe symptoms. In the severe cases, the mortality would usually be very high in spite of any method of treatment. We consider the cases to be severe where the number of convulsions would be about ten, pulse 130, temperature 102° F., coma deep, and where there is evidence of retinal hemorrhages. In the mild cases prognosis was usually good if there was no interference in attempting operative delivery.

The first five years at Manhattan Maternity, the mortality was very high for both mothers and babies. In almost every case labor was terminated early by some operative means. The mortality of these cases was 46 per cent for the mothers. The treatment was based on the mistaken belief that eclampsia was a condition which could only be removed by immediate delivery of the child. During the next five years, the mortality dropped to 13 per cent due to the conservative method in the management of these cases, induction of labor in some cases being the only operative procedure carried out. It is a difficult thing to attempt to draw conclusions regarding any special method of treatment based upon a small number of cases. Elimination treatment carried out vigorously and as early after the onset as possible gives the best results. It is on this basis that the toxemias of the mild type seen frequently in pregnancy, are relieved, and it seems logical to treat the severe types by the same method. Certainly the Dublin results show a mortality of less than 9 per cent based on this theory, and are worthy of consideration.

DR. BUNZEL (closing).—Dr. Davis said that he was more convinced than ever that there was no dependable treatment for eclampsia. No one is more in accord with him than those of us who are working at Sloane, but we do believe that our

greatest weapon of offense is prophylaxis. A great deal has been said about the use of morphine; I am surprised that someone did not say something about the use of paraldehyde, the effect of which is dramatic. The patient comes in with marked signs of toxemia and with convulsions; to control the convulsions we give paraldehyde intravenously, in $\frac{1}{2}$, 1 or 2 c.c. doses, depending upon the size of the patient. It is no sooner in the vein than the patient is in a profound stupor. If you then start the morphine treatment you have eliminated a certain number of convulsions while waiting for the first dose of morphine to take effect.

Dr. Davis spoke also about taking nephritic patients through without the induction of labor when they are first brought in. We have had some cases with eye ground signs, albuminuric and even hemorrhagic retinitis, and they have returned to us later without any signs in the fundi. These cases have also been carried along without induction.

We practically always use morphine in cases of moderate and severe toxemia, but we are more prone to wait until the patient has had a convulsion before giving paraldehyde.

As to the cause of death in the babies, the paper states that in some cases at autopsy no cause of death was found. I agree that these babies are subjected to the toxemia of the mother and that the babies may have died from that toxemia.

Dr. Dorman asked me to speak about the low-protein salt-free diet. It is essentially a carbohydrate diet, made up mostly of vegetables and salads without dressing, bread and butter without salt, and plenty of fluids without milk. Cereals are also included in this diet.

Bad teeth must be taken care of early in pregnancy or, if they have not been cared for then, even in the later months. So far as the tonsils are concerned we do not attempt to do anything with them during pregnancy, but after the pregnancy or between pregnancies we have them cleared up and the patients subsequently go through relatively normal pregnancies.

Dr. Polak spoke of private cases. The series reported included a good many private convulsive cases brought into the hospital having been seen for the first time in consultation. As one of the speakers has said, there still are and always will be emergency cases. The necessity of care for patients in the Clinic was brought out by Dr. Polak. Patients should be brought into the hospital and treated intensively and not allowed to go home except with the understanding that they will return, not just once a week, but if necessary two or three times a week. We should wash our hands of them if they do not agree to do as we say.

Dr. Herrick spoke of the necessity of knowing something about the prepregnancy state of the pregnant woman. It is difficult for a man doing obstetrics to see the patient until after she has become pregnant. If we could have that advantage we would see many more than 5 per cent with substandard kidneys, for Dr. Herrick means I think, the kidneys that have been impaired as a result of the exanthemata of childhood, leaving what we may consider latent nephritis.

Dr. Robinson said that the cases with nephritis do not so often have eclampsia as the cases with hypertension or the so-called hyperpiesia. In our experience we have found that the cases with hyperpiesia more often go through pregnancy without convulsions than those having hypertension, albuminuria or edema.

DR. BECK (closing).—Until the underlying facts concerned in the production of eclampsia are understood we will not know much about the treatment. I have been impressed by the results of morphine and early phlebotomy but I am not going to be misled by a favorable impression in a small series of cases. I had hoped that others would report that they were using a similar routine and that by grouping the results we might have a sufficiently large number to draw proper conclusions.

Obituary

WILLIAM WHITFORD

By JAMES E. DAVIS, A.M., M.D., DETROIT, MICH.

(Secretary of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons.)

WILLIAM WHITFORD was intimately known and highly respected by all of us who had become accustomed to his presence at our meetings. He seemed essential for a successful record of our Transactions, and his substantial personality was distinct among us.



WILLIAM WHITFORD

1858—1923

Always quiet, reliable, pleasant and accommodating, and possessed of a thorough-going knowledge of the details of our work, he had indeed become one of us. He knew our Fellows intimately, and could immediately record their names when they were taking part in the proceedings. It is our high privilege to pay tribute to the man, William Whitford, and to the service he has rendered.

William Whitford passed away suddenly December 10, 1923, at his home in Oak Park, Illinois, of acute heart disease. He was the official

stenographer of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons for over thirty years. He had reported the Southern Surgical and American Medical Associations consecutively for thirty-four years. At the time of his death he was the official stenographer for thirty medical and dental societies in various parts of the United States.

Mr. Whitford was born in Cornwall, England, January 31, 1858. In 1880 he came to America and settled in Chicago in 1881. He was a pioneer in America in medical reporting, and for a time was the only dependence of medical organizations which desired to have an exact record of their proceedings. He was a member of the Standardization Committee of the National Shorthand Reporters' Association and at one time served as its President.

He is survived by his widow and a daughter, May, who acted as his secretary.

To the foregoing memorial the Editor of this Journal desires to add a word of praise and acknowledgment for the labors of a man whose worth will be more appreciated as time goes on and whose presence will be sadly missed from our medical gatherings. His character and ability were widely recognized, his skill, his patience, his grasp of discussions and his wide acquaintance among doctors, all contributed to the value and accuracy of his transcripts. Modest and quiet in demeanor, always prompt and eager to reply to the many demands made upon his time and energy, his memory and accomplishments will long survive in American medical publications in which the Transactions of those many meetings appear, of which he was the faithful "recording angel."

Geo. W. Kosmak, M.D.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

OPERATIONS FOR PERMANENT ENLARGEMENT OF THE CONTRACTED BONY PELVIS IN WOMEN

BY JOHN OSBORN POLAK, M.D., AND GEORGE W. PHELAN, M.D.,
BROOKLYN, N. Y.

DURING the past few years many contributions have appeared in foreign journals on the subject of permanently increasing the size of the contracted female pelvis; in fact, so much has been written on this subject, that we have felt that the status of the procedure should be determined, and to this end we have reviewed the literature, and shall attempt to correlate the several suggestions, and place them in a consecutive manner, with our personal comments, before the profession, so that as obstetricians we may be able to give them their clinical value.

The obstetrician is but the ally of Nature in her effort to save two human lives. Every labor is a physiologic process which is dependent for its outcome on the efficient cooperation of three factors, namely, the powers, the passenger and the passages—each of which must be normal or relatively normal—in order that the patient may have a normal labor. Conversely, therefore, any defect in any of these factors will bring about an abnormal labor.

The passages of the bony pelvis are one of these factors; hence, the progress of labor may be arrested at the pelvic brim by contraction of the inlet, or at the pelvic outlet by decrease in the length of the outlet diameters. In the consideration of the methods which have been, or which may be, employed to increase the bony inlet and outlet, absolute contraction of the pelvis is excluded from the discussion.

In this review we will confine ourselves to a consideration of the methods for increasing the inlet of the rachitic flat, the simple flat, the justminor and the high assimilation pelvis, with its false promontory; for it is the short conjugata vera in these types which causes the relative dystocias at the brim.

At the outlet, funnel pelvis, with its narrow ischiopubic arch and deep symphysis or forward displacement of the sacrum or coccyx, or both, make up the chief causes for arrest; while dystocia from funnel pelvis with its narrow bischial is relatively common. The most infrequent arrest at the outlet, in the course of labor results from forward displacement of the sacrum, or the coccyx or both.

It is to the correction of these obstacles that our attention is

directed. Forward displacement of the sacrum is not necessarily complicated by a funnel outlet, i.e., by a contracted bisischial diameter, though it may be associated with it. In this complication the posterior sagittal diameter is so decreased in length, that the head after reaching the pelvic floor fails to be expelled because of the obstruction presented by the forward displacement of the sacrum and coccyx. No difficulty is encountered in the progress of labor until the head reaches the pelvic floor, but here the arrest is complete. Postural methods for lengthening both the bisischial and the posterior sagittal diameter of the outlet have been suggested, and given clinical trial. The exaggerated lithotomy posture of Schmitt widens the space between the ischial tuberosities, while Klein suggests increasing the anterior-posterior diameter of the outlet by 1 cm. or more by turning the patient on her side and flexing her thighs on the abdomen, and her legs on the thighs—practically placing her in the right or left Sims' position, and allowing delivery to take place in this posture. However, in those cases where the joint between the sacrum and coccyx is ankylosed, or where there is any considerable forward displacement of the lower portion of the sacrum as a whole, posture will fail to sufficiently increase the outlet and permit delivery. In this class of cases, the outlet can be increased by sawing through the sacrum transversely as has been suggested by Eymers.¹ This operation produces a false joint and allows the severed portion of the sacrum with the attached coccyx to recede at the moment of expulsion unless the forward displacement is too pronounced, when the entire pelvic girdle may be enlarged by pubic section.

The technic of Eymers' procedure is as follows: He saws through the front of the sacrum from behind, severing it transversely a little above the point of forward flexion, which point has been previously determined by rectal examination. With the patient lying on her right side, with her thighs flexed, a small longitudinal incision is made through the skin and overlying-fat and fascia on the left side near the sacral border, and just above the point of anterior flexion; then with the finger in the rectum, the osteotomy needle is carefully conducted across the front of the sacrum through the loose connective tissue lying behind the rectum and brought out at a corresponding point on the right side of the sacrum, where it is cut down upon and a saw fitted to its eye which is drawn back through the opening on the left side. With the saw in place, lying across the front of the sacrum, a few sawing movements separate the bone, and this allows sufficient recession of the sacrum and coccyx to permit the escape of the head. If the technic is properly carried out there is but little bleeding, which can readily be controlled by simple compression. When the bleeding has been arrested, the wounds may be closed with sutures.

Comment.—This procedure appeals to us as a rational one, but one, with an extremely limited indication, to be used only in those extreme forward flexions of the sacrum and coccyx which produce outlet arrest. The advantage of this operation lies in the preservation of the strong posterior ligaments and muscular attachments which remain after section through the bone has been made. The retention of these ligaments permits the formation of a hinge joint and allows recession at the moment of expulsion.

It would seem to us that resulting permanent enlargement from this procedure is questionable, for unless the union which results is a ligamentous one (and this is unlikely) osseous repair will take place in the usual manner and the pelvic outlet will not remain enlarged.

In these days of careful mensuration it is hardly possible for these higher degrees of forward displacement of the coccyx and sacrum to pass unobserved and not to be recognized until outlet dystocia occurs; but should this be the case, this operation has a definite indication.

Enlargement of the brim, actually lengthening the conjugata vera, has been obtained clinically for many years by simply placing the patient in the Walcher position. Unfortunately except in the very minor degrees of disproportion the amount of gain is not sufficient to allow engagement and, therefore, more radical methods are necessary.

Since Sigault² first suggested symphysiotomy in 1768, section of the bony pelvic girdle has been looked upon as a possible means of permanently enlarging the female pelvis.

Pubiotomy was advocated by Aitken in 1775, but it was not until 1830 that Stoltz of Strassburg perfected the operation of pubic section by using the chain saw to sever the bone.

In 1891 Gigli³ published the description of his saw (a roughened steel wire) which he had invented for the purpose of cutting through the bones of the pelvic girdle.

Bonardi in 1897 performed the first pubiotomy with the saw. Since that date the operation has had a more or less checkered career until now it is seldom done, except in the Clinics at Leipsic, Munich, Glasgow, Paris and Baltimore; for it has been shown that the operation has an unavoidable mortality and morbidity.

In 1904, through the publications of Gigli, Van de Velde and Doederlein, pubiotomy took the center of the stage, and for about five years hundreds of operations were performed both here and abroad. It supplanted Gigli's hebstectomy and symphysiotomy which had been rejuvenated by Galviati and Morisani.

In spite of many successful results ischio-pubiotomy is no longer practiced. Severance of both the pubic and ischial ramus was no easy operation, and was frequently attended by extensive damage to the nerves and vessels as well as to the contiguous soft parts, resulting in injury to the vagina, urethra and bladder, the formation of fistulas and disturbances in locomotion.

Both in this country and abroad, pubic section as introduced by Gigli, and perfected by Doederlein, has superseded all other methods for enlarging the female pelvis during labor; for not only is it simpler of performance, attended with less mortality and risk, but it is also attended with fewer complications and difficulties.

In addition to the immediate effect which pubiotomy has upon the pelvic diameters, both at the brim and at the outlet, some degree of permanent enlargement may actually take place in the diameters of the brim, the cavity, and in the transverse diameter of the outlet. Such permanent enlargement has actually been observed, for the resulting union is almost always a ligamentous character especially when the section through the bone has been made in an oblique direction.

Williams⁴ has demonstrated that a pubiotomy done on both sides

has actually increased the pelvic diameters and permanently enlarged the pelvis to such a degree that spontaneous labor has subsequently occurred through the previously pubiotomized pelvis. Unfortunately, injury to the subpubic ligament or its partial severance will permit a degree of vesical and urethral prolapse which is not controllable, neither is it correctable by any of the operations for reconstruction of the anterior vaginal wall, so far devised. This of itself we believe to be such an unfortunate sequel that bilateral pubiotomy is seldom justified.

Comment.—In present day obstetric practice pubiotomy has but a limited field, for with our better appreciation of antepartum mensuration and the aseptic conduct of labor, by following the progress of mechanism with abdominal and rectal touch, fewer cases are potentially infected and cesarean section has, in this country at least, taken its place.

Pubiotomy can never be considered as an elective procedure unless we purpose enlargement of the pelvis; impacted occipitoposteriors, mentoposteriors arrested in the cavity—with the child alive and the cervix fully dilated, or unrecognized outlet contraction—with the head at the vulva—make up its chief indications.

In 1912 Rotter and Schmidt⁵ advocated enlargement of the contracted pelvis (where such contraction was confined to the brim as in the rachitic flat, the simple flat, and the high assimilation pelvis with its false promontory) by the removal of a portion of the projecting sacrolumbar promontory, instead of by section through the pelvic girdle.

These authors had in mind the permanent enlargement of the female pelvis, and advocated this procedure as a prophylactic measure for succeeding postoperative labors—in other words, they suggested this as a procedure which was to spare the woman who was affected with a deformed pelvis, the necessity of repeated operations at delivery, by permanently increasing the size of the bony girdle to a point sufficiently large to permit of spontaneous birth.

Rotter increases the length of the conjugata vera by resection of the promontorium, and suggests the following technique:

With the patient in a high Trendelenburg position, a longitudinal incision is made through the abdominal wall in the median line from the umbilicus to the pubis, exposing the pregnant uterus, which is everted and held forward while the intestinal loops are pushed upward toward the diaphragm and kept there with well placed gauze pads. The sigmoid is grasped and drawn to the left exposing the promontory. Next a longitudinal incision is made through the peritoneum and subperitoneal fatty tissues over the promontory, the median sacral artery is tied above the body of the last lumbar vertebra; the accompanying veins are also isolated and ligated. When this has been done the promontory is covered only with the crura mediales of the diaphragm, the anterior longitudinal ligament and the thin periosteum. It is not, however, necessary to cut these structures for they may be separated from the front of the promontory by blunt dissection.

With these tissues retracted, the next step consists in using the chisel on the body of the last lumbar vertebra which measures from 3 to 3.5 cm. The chisel must be very finely ground and slightly con-

cave. A piece of from 1.5 to 2 cm., which is a flat ovoid and consists of a part of the last lumbar vertebra, the upper part of the sacral vertebra and the intervertebral ligament, is removed. The hemorrhage is inconsiderable and may be stayed by pressure. When it is controlled, the soft parts are reunited over the bony wounds, the uterus replaced and the abdomen closed.

It is claimed that by this procedure, the true conjugate may be lengthened by 1.5 to 2 cm., and in the case of the rachitic flat or high assimilation pelvis, the brim can be converted into a normal or approximately normal one.

The indications for this operation are found where the fault lies in the line of the conjugata vera due to the prominence of the lumbosacral joint. The lowest limit which justifies employment of this procedure has been set at 7 cm., and it is claimed by the originator that the technic is very simple. The bony wound is small, and the prognosis for primary healing good, while the firmness of the spinal column is not decreased.

He further claims that the operation has a wide field of usefulness in increasing the size of the brim in the flat pelvis, and as a prophylactic or elective operation, where previous deliveries have resulted in stillbirths, craniotomies, or operative deliveries.

Comment.—Several questions naturally arise in the minds of obstetric surgeons:

1. Does resection of the lumbosacral promontory weaken the spinal column?
2. Does permanent enlargement actually follow this operation?
3. Is it technically simple?

Seitz says that the number of cases treated in this manner has not encouraged him to follow the procedure. He operated upon 10 cases and found that extensive callous formation was the consequence, and that elongation of the conjugata vera was again diminished by this callous production. His conclusion is that resection of the promontory is a grave operation and its prophylactic effects on succeeding labors seems to be problematic. To the reviewer the procedure does not seem technically to be a difficult one. Intervention of this type is, after all, of some importance, for it can be done only in the early months of pregnancy, or at the time of doing a cesarean section for pelvic obstruction. It thus complicates by protracting the operation, and exposes the patient to the difficulty of controlling hemorrhage from the cut bone, as well as to a greater danger from infection.

We feel sure that here in America, where section has been perfected to a degree that has reduced the mortality to less than 1 per cent—and where the public has been educated to repeated deliveries by section—that it will be difficult to gain consent for an operation that does not assure permanent safety by positive increase of the conjugate and at the same time increases the operative risks of section.

The third suggestion that has been made by Costa⁶ for increasing the size of the pelvis, is that of partial symphysectomy or excision of the upper part of the pubic symphysis. The author states that stenosis of the pelvis is, in a great number of cases, confined to the true conjugate and that by excision of the upper part of the pubic symphysis the obstacle to labor is removed.

Costa claims that the operation which he suggests is not only an

easy one, but is quite harmless because there are no organs in the immediate field that one might fear to injure. It can be done entirely outside of the peritoneum during the course of pregnancy, or when the woman is in labor. He describes his technic as follows:

He exposes the prevesical space of Retzius through a Pfannenstiel incision just above the upper pubic border, with the patient in the Waleher position. The recti are retracted and their tendons cut diagonally just above their pubic attachment for 1 cm. on each side. Compresses are then carefully placed to protect the bladder and peritoneum, so as to expose the upper border of the pubic symphysis from pubic spine to pubic spine. With a heavy scalpel a transverse incision is made through the periosteum at the highest point on the posterior surface of the symphysis from one spine to the other, and the periosteum dissected off from the posterior face of the symphysis for half its height. After this is done a piece of bone and cartilage is excised obliquely with a heavy scalpel, from above downward and from before backward, to almost half the height of the symphysis. This excision should include the retropubic protrusion which must be removed to derive the best advantage from the operation; 1 or even 1.5 cm. of bone may readily be removed without weakening the pelvic girdle, for the strong ligamentous attachments are anterior and below the symphysis. The operation not only increases the length of the conjugata vera, but the joint becomes more elastic. It is really a delicate determination to remove enough bone to secure lengthening and elasticity without causing fracture. The operation can be performed during pregnancy or even when the patient is in labor. When employed during labor, the best time for its performance is when the dilatation of the cervix is complete. Delivery should be spontaneous.

In 1922 Costa⁷ suggested the combination of his symphysectomy with subcutaneous symphysiotomy to limit the degree of separation of the pubic bones at the time the head passes through the pelvis. The lower limit for symphysectomy is 7.5 to 7.8 cm., while when it is combined with symphysiotomy, the indication may be extended to a conjugate of 7 cm. This rule only applies to pelves contracted in their anterior-posterior diameters.

Costa has done partial symphysectomy on seven women with no mortality. All of them were out of bed on the eleventh day, with no postoperative complications. Costa summarizes his results in the following conclusions:

(1) Partial symphysectomy is a simple operation; (2) There is no danger of hemorrhage; (3) It can be done during pregnancy without disturbing its course; (4) It leaves a depression, so that the pelvis remains permanently enlarged, which is important for later births; (5) It can be done during labor, even after waiting until it is seen whether the presenting part succeeds in overcoming the stenosis; (6) It gives a prolongation of the conjugata vera which can be evaluated at from 2.5 to 3 cm.; (7) It allows the bending of the fetus and the anterior parietal bone and makes the mechanism of the delivery easier in a flat pelvis; (8) It does not leave any disturbance in walking, or other inconvenience.

Comment.—The attractive point in his operation is that it is simple, extraperitoneal, can be done in the presence of fever, and while enlarging the anterior-posterior diameters, does not endanger adjacent

structures. It may come into competition with cesarean in the potentially infected case of parietal presentation where the cervix is fully dilated.

Another suggestion for enlarging the female pelvis by a pelvioplastic method was made by Brugnattelli and Verga⁸ in 1914. This method consists in a free autoplasmic transplantation of half of the pubic symphysis. The symphysis is cut horizontally and divided into two parts, the upper piece is resected and used for transplantation between the ends of the separated pubic bones after a symphysiotomy is made. The wedge is kept in position with two metallic sutures, and the pelvis immobilized. This operation has been performed on dogs, but fortunately not on the human being, for not only is the procedure attended with technical difficulties but may cause unforeseen trouble when attempted on the living.

CONCLUSIONS

Review of the foregoing procedures shows: (1) that the female pelvis may be permanently enlarged by section of the pubic bones, resection of a portion of the symphysis and resection of anterior-portion of the promontorium;

(2) That all of these measures carry with them a definite mortality and morbidity;

(3) That with the exception of pubiotomy, clinical experience is too limited to justify their general employment and finally;

(4) That until we have additional data as to the fate of permanent enlargement and an improved mortality in these procedures—cesarean section will be accepted as a more rational selection.

REFERENCES

- (1) *Eymer, H.*: Zentralbl. f. Gynäk., 1923, xlvii, 98. (2) *DeLee*: Principles and Practice of Obstetrics, p. 943. (3) *DeLee*: Ibid., p. 943. (4) *Williams*: Am. Jour. Obst., July, 1911, lxiv, No. 1, p. 106. (5) *Rotter, H.*: Zentralbl. f. Gynäk., 1912, xxxvi, 385 and *Schmid, H. H.*: München. med. Wchnschr., August, 1912, No. 34, p. 1846. (6) *Costa, R.*: Zentralbl. f. Gynäk., 1921, xlv, 200. (7) *Costa, R.*: Ann. di ostet. e ginec., 1922, xlv, 393. (8) *Brugnattelli and Verga*: Folia Gynecologica, 1914, lx, 195.

Selected Abstracts

Endocrinology

Kreis, Jules: Clinical Researches of the Sympathetic and Parasympathetic System in Relation to Menorrhagia. *Gynécologie et Obstétrique*, 1922, v, 543.

The author calls attention to a physiologic method of studying the function of the autonomic nervous system in conjunction with the endocrine system. He thinks it is of considerable importance for the gynecologist to consider the disorders of the sympathetic system in relation to ovarian dysfunction. He recognizes certain types of functional disorder and thinks the ability to localize these troubles is of the greatest importance. It is also important to estimate the tonic capacity of the different systems in each subject for defense and maintenance of the equilibrium of the autonomic nervous system. For example, the injection

of ovarian extract may have a depressive influence on the parasympathetic and change the lack of equilibrium in favor of the sympathetic system. The author advocates a systematic study of the autonomic nervous system in diagnosing menstrual disturbances and thinks in this way it may be possible to institute an appropriate therapy. The author makes use of pilocarpine as an excitant of the parasympathetic, of adrenaline as an excitant of the sympathetic, and of atropine which paralyzes the parasympathetic. The reactions to these different agents give a clue to the source of the disorder.

F. L. ADAIR.

Williamson, Herbert: *The Pituitary Gland in Its Relation to Obstetrics and Gynecology*. The Clinical Journal (London), 1922, li, 541.

The writer discusses the endocrine system in its relation to general development, paying particular attention to the disturbances in the anterior pituitary lobe causing retarded sexual development. Some cases of marked dysmenorrhea may be benefited by pituitary treatment combined with thyroid.

In labor the writer never uses more than 1 c.c. of a 10 per cent pituitary extract. He never uses the extract if labor has been induced with either bag or bougie, nor in toxic cases because of the preexisting muscle damage due to the toxemia. He seldom uses it in first stage except in certain cases of placenta previa or separated placenta. In the second stage, pituitrin can be administered when the head is low in the pelvis and there is no obstruction and the patient a multipara, but the forceps must be ready. If the baby is not born in fifteen minutes, delivery should be by forceps. The extract is a definite menace to a primipara. The fetal death rate is higher where the extract is employed. In the third stage of labor it should never be used until the placenta is delivered because of the possibility of hour glass contraction. Postpartum hemorrhage and afterpains may be relieved by the use of pituitary extract. Its action is speedier if directly injected into the uterus. The pituitary gland by hyperactivity may cause the transient glycosuria of pregnancy.

A. C. WILLIAMSON.

Volpe, C.: *Reactions to Extracts of the Posterior Pituitary in Pregnancy*. Archivio di Ostetricia e Ginecologia, 1922, xvii, 49.

The writer presents a brief outline of the physiology and pathology of the hypophysis, with particular reference to the posterior lobe. The action of pituitary extract was studied by him in a series of pregnant women in order to test the theory of a hyperfunction of the posterior lobe during pregnancy. For this purpose injections of pituitrin (Parke-Davis) were made hypodermically, using single doses of 1 c.c. each, corresponding to 0.2 gm. of dried substance.

Women in the latter months of pregnancy reacted in one of the following ways as regards blood pressure:—(1) It rose rapidly to some 80 mm. above normal 15 minutes after injection; (2) there was a slighter rise of some 15 mm.; (3) there was a very slight and gradual rise not exceeding 10 mm.; (4) the blood pressure dropped slowly about 25 mm., then gradually rose to normal level.

Cases in labor showed either a sudden rapid rise of pressure or a slight gradual increase. The same changes were observed in women in the puerperium. No cases in labor or in the puerperium were observed to have a drop in blood pressure.

Injection of a second ampoule of pituitrin half an hour after the first did not cause a further rise of pressure, but rather a progressive diminution. Pulse rate was always diminished, regardless of blood pressure reaction. Results on kidney function and carbohydrate excretion were inconclusive, save that in no case was

there increased diuresis. No influence was noted on respiration or on the general condition.

The author concludes that hyperfunction of the pituitary (posterior) in pregnancy is rarely marked and may be replaced by hypofunction. The normal interrelation of the elements of the endocrine system is probably disturbed by the action of the corpus luteum, while the function of the pituitary is doubtless supported during pregnancy by the adrenals.

THOS. R. GOETHALS.

Mosse, S., and Fabre, Maurice: Extract of Hypophysis in Metrorrhagia. *Gynécologie et Obstétrique*, 1922, v, 228.

This extract has the following action on the utero-ovarian structures: (1) A constrictive action on the muscular fibers of the uterus; (2) a vaso-constrictive action on the utero-ovarian vessels; and (3) it tends to reduce the internal secretion of the ovary. Any effect on metrorrhagia must come about through one of these three actions. The writers think it has excellent action in cases of metrorrhagia and menorrhagia that occur at or about the time of puberty. At the menopause in hemorrhages excited by hyperactivity of the ovaries, use of this extract gives excellent results. In other functional disturbances it seems to give good results. They think its use is strictly indicated at the two extremes of sexual life, and they have used it by both hypodermic and internal administration. It is well to examine the heart, the urine, and note the blood pressure before using this drug.

F. L. ADAIR.

Hertzler: Pelvic Findings in One Hundred Cases of Toxic Goiter. *American Journal of Surgery*, 1923, xxxvii, 274.

From a study of 100 cases of thyroid enlargement occurring in women during the childbearing period, Hertzler formulated the following conclusions: (1) Many patients who have thyroid enlargement and evidence of thyroid dysfunction present evidence also of disturbance of the pelvic organs either functional or anatomical or both;—(2) Such association is too frequent to be accounted for as mere coincidence;—(3) Those who deny any association between the pelvic organs and the thyroid gland should present their evidence in a concrete way.

In 13 cases the pelvic organs functionated normally, 26 had dysmenorrhea, 7 had displacements, 10 dysmenorrhea and displacement combined, 4 had metrorrhagia, and 4 a scanty flow, 3 showed myoma and 8 had been operated on previously for some trouble. Chronic pyosalpinx was diagnosed in 7 cases.

WM. KERWIN.

Blamoutier: Kraurosis Vulvae and Exophthalmic Goiter. *Paris Médical*, 1922, xii, 334.

Since the cessation of ovarian function causes a break in the interglandular equilibrium, Blamoutier thinks that we might expect disturbances in other endocrine glands at the menopause. Since the ovary and thyroid seem to have a more direct relation to each other, we should expect this dysfunction to be especially apparent in the latter. The author believes that this is, in fact, more often the case than is at present recognized.

To support his claim, he reports a case in which Graves' disease and kraurosis vulvae coexisted in a woman of fifty-two years, and in whom the kraurosis improved coincidently with the improvement of the goiter symptoms.

After the diagnosis of both conditions was established beyond a doubt, the patient was put on the following treatment: The thyroid was irradiated by x-ray and the vulva by means of the high frequency current. At the same time she

was put on a rigorously restricted diet and was given ovarian and hypophysary extracts and valerianate of quinine internally. Under this combined treatment all symptoms disappeared at the same time, only to recur when the patient returned to work and neglected her medication and diet. On putting her at rest and re-instituting the diet and the administration of the previously mentioned drugs, she again improved.

[One is struck with the great variety of treatment administered which, it would seem, would nullify to some extent the force of the author's argument. Most noteworthy is the claim that, under treatment, the vulvar mucosa regained its moisture and pinkish hue.]

R. E. WORUS.

Aub and Taylor: The Effect of Body Tissues Other Than the Thyroid Upon the Basal Metabolic Rate. *Endocrinology*, 1922, vi, 255.

Aub and Taylor, in studying the effect of body tissues upon the basal metabolic rate, make a rather complete survey of the literature on the relation of the gonads to the metabolism and conclude that the work done is far too little to justify any clear cut decisions.

A study of the literature would seem to indicate that the removal of the gonads causes in animals a rather slow fall of the metabolism which amounts to about 15 per cent three weeks after castration.

W. KERWIN.

De Rouville and Sappey: The Action of the Lutein Cells of the Ovary in Certain Uterine Hemorrhages. *Gynécologie et Obstétrique*, 1922, v, 1.

The authors review the literature and report a series of observations. They give some plates of microscopic sections from the different cases and draw the following conclusions: (1) Menstruation is due to the internal secretion formed by the lutein cells which are the interstitial cells of the theca interna of the follicles or the cells of the corpus luteum. (2) A hyperfunction causes an abnormal hemorrhage, normal function permits normal menstruation. The hypofunctioning ovary produces amenorrhea. (3) In the interpretation of the secretory value macroscopic examination of the ovaries has no value. Only the microscopic examination can give definite information.

F. L. ADAIR.

Ludwig, Fritz: Concerning the Functional Therapy of Dysmenorrhea. *Schweizerische Medizinische Wochenschrift*, 1922, lii, 1198.

The causes of dysmenorrhea are manifold. The older authors considered chiefly mechanical changes in the cervical os, flexions of the uterus, premenstrual swelling of uterine mucosa or uterine endometrial changes. Certain nervous symptoms during periods pointed toward disturbance in the nervous system. The theory of nasal dysmenorrhea next made its appearance. Of late years we have had mentioned some such classification as idiopathic, congestive, membranous, obstructive and ovarian forms. Block mentions three types: mechanical type with colicky pains and difficulty until the flow is established; ovarian type distinguished by marked mucosal swelling, large amount of blood discharged, headache, vomiting and uterine cramps relieved by intranasal cocaineization or subcutaneous adrenalin injection, finally the vagotonic type, with symptoms very similar to those of the first class and relieved by atropine. Working with an isolated uterus and using various drugs the author arrived at the following conclusions:

(1) The uterus normally has a certain muscle tonus which changes with definite contractions and irritations. (2) Abnormal contractions and irritations are the underlying causes of dysmenorrhea. (3) Dysmenorrhea is thus a disturbance of

the uterine tonus. (4) The normal tonus is maintained on a certain plane by internal secretion and a disturbance of these causes a uterine disturbance. (5) Adrenalin is an irritant at first and then checks the disturbance. (6) Disturbance of the endocrine function in hypophysis, ovary, corpus luteum, adrenal, thyroid, all will cause conditions bringing about dysmenorrhea. (7) Because of this relationship something of value may be found in organotherapy. (8) The drugs of value in allaying pain are papaverin, benzylbenzoate, eventually combined with narcotine, atropine and camphor, etc. (9) Morphia and codeine were not considered.

A. C. WILLIAMSON.

McIlroy: The Ovum as an Internal Secretory Organ. New York Medical Journal, 1922, cxv, 404.

The author develops the claims of the ovum for consideration as an organ of internal secretion, in addition to its other more complicated and specialized functions. She calls attention to the marked changes produced in the uterus, the mammae and the organism as a whole which occur upon implantation of the fertilized ovum. These are produced by unknown secretions poured into the blood stream which bear comparison with the chemical secretions from the endocrinous organs and which markedly influence the latter. The ovary is concerned with the malnutrition found in osteomalacia and pregnancy has also an influence upon this disease. The ovary is involved with the thyroid in calcium metabolism and its storage in the later months of pregnancy. The pituitary is enlarged after oophorectomy and parathyroidectomy and in pregnancy. The adrenal cortex is enlarged in pregnancy and pigmentary changes occur in the skin. The blood pressure is raised in pregnancy and there occur disturbances in the nitrogen and the sugar metabolism. Certain toxins or chemical substances generated by the ovum are rendered innocuous by antibodies which owe their protective energy to the healthy condition of the thyroid and other endocrinous organs. The enlargement of the thyroid, pituitary and adrenal cortex in pregnancy proves the functional harmony between the ovum and the internal secretory organs. This enlargement represents a work hypertrophy. Therefore, although the ovum is only a temporary sojourner in the maternal organism, it has some claim for inclusion among the organs of internal secretion.

MARGARET SCHULZE.

Novak, Emil and TeLinde, Richard W.: The Pathological Anatomy of the Corpus Luteum. (Abscess, Cyst, Hematoma, and Neoplasm.) Bulletin of the Johns Hopkins Hospital, 1923, xxxiv, 289.

A sine qua non in the study of the pathological anatomy of the corpus luteum is a knowledge of the normal life cycle of this structure—its histogenesis, its cyclical variations, and its manner of retrogression. The corpus luteum exhibits individual variations within physiological limits. The most important of these are cystic distention of the corpus and an excessive degree of hemorrhage into the lumen during the stage of vascularization. The most important pathological conditions affecting the corpus luteum are (1) abscess formation, (2) cyst, (3) hematoma, (4) neoplasm. Corpus luteum abscesses are very frequent, comprising a considerable proportion of all ovarian abscesses. It is probable that they arise from infection of normal corpora lutea, corpus luteum cysts, or corpus luteum hematomas. In regard to cysts and hematomas, it is often difficult to draw a line between these and the individual variations observed in the corpus luteum under normal conditions, as mentioned above. The size of the structure and the histological character of its limiting wall are the two most important factors in this differentiation. Both cysts and hematomas are usually associated with pelvic inflammatory disease. Corpus

luteum cysts may be subdivided into (1) the recent type, in which the lutein layer is well preserved and in which there is little or no fibrous tissue deposit between it and the contents, and (2) the old type, in which the age is indicated by retrogression of the lutein zone and by the heavy, organized layer on its lumen side.

Analyses of the menstrual histories of recent corpus luteum cysts indicate that, in general, the lutein zone corresponds to the developmental stage which would be expected at the time, and that the structure, in spite of its cystic nature, is still of functional importance. The older cysts, on the other hand, have entirely dropped out of the physiological cycle, and exert no influence on the menstrual function.

These findings throw doubt upon the prevalent impression that corpus luteum cysts have a tendency to delay menstruation, and that they bring about a clinical syndrome easily mistakable for that of tubal pregnancy (amenorrhea followed by prolonged bleeding, together with a one-sided mass). While it is possible that there may exist a definite endocrinopathic or other entity of this so-called corpus luteum persistens type, it is exceedingly difficult in this kind of case to rule out the possibility of a very early abortion of a tubal or uterine pregnancy. The difficulty of eliminating pregnancy is enhanced by the fact that complete resorption of the embryo may conceivably occur.

Corpus luteum hematomas are commonly due to excessive hemorrhage into the lumen during the stage of vascularization. They permit of the same subdivision into recent and old. Furthermore, these types bear the same relation to the menstrual phenomenon as the corresponding types of cysts.

Cysts and hematomas are at times encountered whose walls present the characteristic corpus albicans structure. With the exception of the few very large cysts of this character which have been reported, but which are of doubtful nature, the corpus albicans cysts and hematomas are probably merely the end-results of normal cystic or hemorrhagic corpora lutea.

Various authors have described ovarian tumors of supposedly lutein origin. There is no reason why such tumors should not occur, and the writers have observed growths, chiefly carcinomas, in which morphologically such an origin was suggested. Some at least of the 14 cases of lutein cell tumors collected from literature by Glynn are of a very doubtful nature, and further investigation will be necessary before the possibility of a lutein origin of certain ovarian tumors can be accepted as definitely established.

The condition spoken of as multiple lutein cysts of the ovary, found with some cases of hydatiform mole and chorioepithelioma and sometimes erroneously designated as multiple corpus lutein cysts, is due to a widespread lutein-like transformation of the theca cells in the atretic follicles, which are greatly increased in size and number.

C. O. MALAND.

Schickele, G.: *Studies of Ovarian Function*. Gynécologie et Obstétrique, 1922, v, 425.

In previous articles the author has recognized that there is no definite relationship between the corpus luteum and menstruation. He thinks that ovulation and menstruation represent two independent processes. The presence of a functioning ovary is the sole requirement for menstruation. He mentions the different elements of the ovary which might regulate menstruation. The primordial follicles may undergo alternative processes which are little understood. The corpus luteum presents stages of retrogressive changes characterized by (1) formation of a definite internal membrane (Type I); (2) the separation of lutein cells into groups by a network of fibers (Type II); (3) the diminution in number and volume of

the lutein cells (Type III); and (4) very few vestiges of the lutein cells (Type IV). Sometimes the development of a follicle is suddenly arrested. It may undergo degenerative changes. During pregnancy the follicles are apt to undergo rather marked proliferation of the cells. The author analyzes 40 cases, which he divides into three groups. From his observations he draws the conclusion that the corpus luteum does not in any way regulate menstruation. In Group I (premenstrual cases) it was impossible to trace a relationship between the evolution of the corpus luteum and the forthcoming menstruation in 7 of the 11 cases. Eleven of the cases in Group II (postmenstrual) gave no satisfactory evidence of relationship between the two processes. The 9 cases in Group III (interval) seem to confirm the conclusion that there is no definite relationship between the corpus luteum and the menstrual cycle. He reports two other cases in some detail, both of which further confirm this conclusion.

F. L. ADAIR.

Lahm, W.: The Development of the Interstitial Glands in the Testicle and Ovary. *Monatsschrift für Geburtshilfe und Gynäkologie*, 1922, lviii, 128.

The author includes a study of the testicle because in this organ the development is easier to follow than in the ovary. In both organs generative and incretory portions may be observed. Suppression of the generative portion does not interfere with the activity of the incretory cells.

The incretory or interstitial cells are eosinophilic with definite granulations, large nuclei and clear nucleoli. There are two main theories as to the origin of these interstitial cells. Some advocate that they are epithelial in origin while others claim they are of connective tissue origin. In the ovary there are two types of these cells, namely, the true interstitial cells and the theca interna cells of the atretic follicles.

The interstitial cells of the ovary are, according to Lahm, more certainly of connective tissue origin than are the cells of Leydig in the testicle. These cells contain fat in abundance and are of trophic importance for the development of the follicles. The theca interna undoubtedly supplies the vascular membrana granulosa with nourishment and is a factor in the regression of the corpus luteum. The author considers the interstitial cells of the ovary as true glands because they occasionally show the typical structure of ductless glands, (large, richly protoplasmic cells arranged in rows, with radiating capillaries as a framework which surrounds the cells.) These glands on occasion produce a hormone which, while not vital, is desirable.

Embryologically the male genital glands may be differentiated microscopically from the female glands, by the end of the second month. In the testicle at this period, the arrangement is more orderly than in the ovary. The genital cells (large) and the interstitial cells (small and undifferentiated) may be recognized. In the testicle the interstitial cells are probably of epithelial origin and arise from cells which are different from the genital cells only by their greater affinity for stains. On the other hand, the interstitial gland of the ovary is derived from connective tissue. Its development as an endocrine gland is greater than that of the testicle and is similar in many ways to the corpus luteum.

J. P. GREENHILL.

Matsumo: The Interstitial Gland in the Ovary of the Newborn. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1923, lxxxv, 523.

According to most authors, the internal secretion of the ovary, up to the time of appearance of the corpus luteum, is to be ascribed exclusively to the so-called interstitial gland. There is no doubt that the ovary does exert an internal secretory

influence before the appearance of the first corpus luteum. The gonads have even in very small children an influence upon the development of the body and upon the habits of life and mental tendencies, and it is even possible that in intrauterine life and the earliest days of extrauterine life certain internal secretory influences may go out from the ovary, and, therefore, the tissue that forms the anatomic substratum of this function must be present at this time. The combined theca interna cells of the atretic follicles are considered as the interstitial gland by Aschner and other authors, and as the puberty gland by Steinach. In examination of the ovaries of 25 fetuses and newborn infants, the author found follicles undergoing atresia, and also completely atretic follicles, and discovered that, in general, with signs of atresia, the theca interna of the follicle undergoes changes in the form of proliferation and increase in size of its cells and in the form of marked fatty degeneration. In typical cases, the cells were arranged in the form of nests and strands, between these were numerous blood capillaries which give this theca tissue a certain resemblance to the tissue of known glands of internal secretion. Yet the theory that this changed thecal tissue is the sole carrier of the internal secretory function of the youthful ovary is not fully satisfactory. One of the chief arguments against this theory is the fact that the occurrence of this tissue is very inconstant. This would mean that in a certain proportion of cases the ovary of the fetus and newborn has a more or less pronounced internal secretory function, yet in the majority of cases, it has not. The further fact that the greatest development of the so-called interstitial gland occurred in the ovaries with small cystic degeneration, speaks also against an internal secretory function of this tissue.

The changes which occur in the theca tissue are explained by Stieve and Meyer as a storage process in follicular development and follicular atresia, and this explains fully the increase in size and later fatty degeneration of the cells. The inconstancy of its occurrence speaks against a great influence of this tissue in relation to the general organism. The histologic picture of the ovary of the fetus and newborn infant gives us no right to designate the theca elements changed by follicular atresia as the interstitial gland and to ascribe to it alone an internal secretory function.

MARGARET SCHULZE.

Stielkel and Zondek: Clinical Investigations of the Value of Organotherapy in Ovarian Hemorrhages. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1922, lxxv, 83.

The authors briefly review the history of endocrinology beginning with Brown Sequard's investigations with testicular extract. The remarkable results of thyroid extracts in myxedema have led to expectations of similar striking results with other endocrine preparations. Yet the active principals of only two endocrine glands, the adrenal and the thyroid, are chemically known. Ovarian extracts are chemically very different, according to whether they are alcoholic or aqueous extracts, and also whether the albumin has been digested or not.

Accepting the menstrual bleeding as one of the most objective signs of ovarian activity, the authors determined to investigate the effect of various endocrine preparations upon it. One hundred and eighteen cases of ovarian hemorrhage in 12,000 clinic patients were treated with various extracts.

Fifteen cases of the severe hemorrhage of puberty were treated, varying from 12 to 19 years of age. Most of these had received previous treatments with styptics and other measures and had bled profusely for long periods before organotherapy was instituted. Twelve of these cases were relieved by organotherapy, three did not react and were later treated by radiation. The fact, however, that corpus luteum, hypophyseal extract and testicular extract were of almost equal efficacy in these

cases led the authors to believe that the result was not a specific endocrine reaction but some unspecific general effect. Similar, though not quite such successful results were obtained in the menorrhagias of the second and third decades. The effect in all cases is probably a direct one on the uterus rather than ovarian endocrine reaction. This is further indicated by the fact that menopausal hemorrhages were far less amenable to treatment, since in these cases arteriosclerotic changes in the vessels hinder their contractility. Further experiments with nonspecific chemical substances, as normal salt, calcium preparations, and even in very neurotic cases with sterile water injections were often successful. These results add further probability to the theory that the organic preparations are not specific in their effect. Physiologic experiments on the action of the different extracts on neuromuscular and vascular preparations are to be detailed in a later paper.

MARGARET SCHULZE.

Novak: An Appraisal of Ovarian Therapy. *Endocrinology*, 1922, vi, 599.

Novak carries one rather speedily through the twenty-five years of history covering ovarian therapy. He surveys the literature accurately and places a proper valuation on the good that has come through an extensive trial, devoting pages to lambasting the manufacturer, retailer and clinician and allowing a few lines to credit those who have been responsible for the limited knowledge that has been brought to light. He rightfully infers that only the first lap of the relay has been won, and that the result of the race is dependent on the numerous sprinters who have yet to come through with results. Willingly or unwillingly, those who have seen brilliant results from ovarian medications must admit that they were looking through magnifying lenses. His effort to ascertain the errors in manufacture are commendable: for given a dependable extract, Novak and other sceptical clinical experimenters, aided by the biologic chemist, will eventually clear the smoke cloud that has been so thoroughly laid by the writer. His admission of scepticism plus the accurate knowledge so far obtained, allows a ray of sunshine to creep through.

WM. KERWIN.

Zondek: 'Experimental Investigations of the Value of Organotherapy. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1923, lxxxvi, 238.

Following the author's clinical investigations of the value of organotherapy in ovarian hemorrhages, which led to the conclusion that one could not speak of a specific endocrine action of the organ extracts, he has attempted to confirm this conclusion by carefully conducted experimental observations, which he describes in detail.

Experiments were made with various commercial organic extracts in their effects upon the isolated heart of the frog, upon the isolated uterus of the guinea pig, upon the intestines of the rabbit, upon the neuromuscular apparatus of the blood vessels, upon the blood count, upon the coagulation of the blood and upon the metabolic rate of a myxedematous, and of a castrated patient. His results showed that there was no specific reaction resulting from any organic preparation in any of these experiments, but that apparently the process of preparation, and particularly the removal of proteins destroyed the specific endocrine substances. The hypophysis formed the sole exception, for here even the deproteinization did not affect its characteristic action upon smooth musculature. On the other hand, the transplantation of an ovary into a castrated patient not only relieved her very severe subjective symptoms but also increased her basal metabolic rate 15 per cent, though this effect lasted only three months.

The author, therefore, concludes that only by the transplantation of the endocrine glands, or by the ingestion of chemically unchanged preparations, but not by the injection of prepared extracts, can one expect any effective endocrine substitution therapy.

MARGARET SCHULZE.

Geist and Harris: Experimental Investigation of the Value of the Various Commercial Ovarian Extracts. *Endocrinology*, 1923, vii, 41.

Experimental work carried on by Geist and Harris, with the use of commercial products of ovarian extract in rabbits after castration showed the ineffectiveness of these products in preventing atrophy of the uterus. All the animals showed a tendency to loss of weight which the writers ascribed to an increase of thyroid activity. They gave the extract intravenously. Thirty-eight experiments were completed. The animals were castrated so as to disturb as little as possible the circulation of the uterus. The uterus was removed at different periods ranging from 14 to 85 days following castration. From 3 to 32 injections were given. Sections of the uterus showed atrophy in all cases while the cervix remained normal; the breasts showed marked atrophy; thyroids were enlarged; pituitary glands showed little or no change; adrenal showed a tendency to areas of necrosis. They conclude from their experiments in rabbits that the commercial preparations when given in fairly large dosage have no effect in preventing the castration atrophy of the uterus or breast, but they do cause a definite decrease in the body weight.

W. KERWIN.

Jacoby: The Effect of the Placenta on Menstruation. *New York Medical Journal*, 1923, cxviii, 619.

In order to test the theory that the internal secretory action of the placenta depresses the ovary and its allies, the authors administered placental extract in five grain doses regularly three times a day for at least three months in a series of twenty-five cases in which menorrhagia was a prominent symptom. Four showed no change in menstrual function; the other twenty-one all showed a diminution of the amount of blood lost. The duration of the flow was usually reduced, and the amount of blood lost noticeably diminished. The discomfort and pain during menstruation was considerably lessened in many instances. The blood pressure during the taking of the placental extract usually fell about 10 mm. No ill effects were reported from prolonged taking of the extract except in a few instances in which nausea and vomiting occurred. In spite of the small series, the large preponderance of successful cases lend encouragement to the view that the secretion of the placenta is effective in controlling the hyperactivity of the ovary and the glands aiding it in its function.

MARGARET SCHULZE.

Puppel, Ernst: The Effect of the Placentaoptone. *Archiv. für Gynäkologie*, 1923, cxvi, 571.

By hydrolysis of the placenta with 10 per cent sulphuric acid, Puppel has produced an optone which, when injected into female rabbits, produces a marked hypertrophy of the uterus and which, when used upon human beings, acts as a strong oxytocic in labor. It has also been used with good effect in dysmenorrhea, oligomenorrhea, febrile abortion (to expel secundines), and in sterility. Optones made from other organs have shown no effect on the uterus of rabbits. The effect appears only when a strong solution is used, of which 1 c.c. corresponds to 1 gram of fresh placenta.

RAMAY SPILLMAN.

Books Received

Acknowledgment is made of the receipt of the following books, selected reviews of which will appear in early numbers:

OBSTETRICAL NURSING. A manual for nurses and students and practitioners of medicine. By Charles Summer Bacon, Ph.B., M.D., Professor of Obstetrics in the University of Illinois and in the Chicago Polyclinic; Medical Director in the Chicago Lying-in-Hospital and Dispensary, etc. Second edition, thoroughly revised. 1924, Lea & Febiger, Philadelphia.

DIE GESCHLECHTSKRANKHEITEN. Ein Grundriss fuer Studierende and Aerzte. Von Dr. Karl Zieler, Professor und Vorstand der Universitaetsklinik fuer Haut und Geschlechtskrankheiten in Wuerzburg. Mit 17 Abbildungen im Text and 1 Tafel. Zweite vermehrte Auflage. 1922, Verlag von Georg Thieme, Leipzig.

LEITFADEN FUEER DEN GEBURTSHILFlichen OPERATIONSKURS. Von Dr. Albert Doederlein, Geh. Hofrat, Professor der Geburtshilfe und Gynaekologie der Universitaets-Frauenklinik in Muenchen. Vierzehnte und fuenfzehnte Auflage. Mit 173 Abbildungen. 1923, Verlag von Georg Thieme, Leipzig.

DISEASES OF THE BREAST. By Willmott H. Evans, Consulting Surgeon of the Royal Free Hospital. With 106 illustrations, of which 15 are colored. 1923, University of London Press Ltd., London.

DIAGNOSIS AND TREATMENT OF ACUTE ABDOMINAL DISEASES, including Injuries and Complications of External Hernia. By Joseph E. Adams, Surgeon to St. Thomas's Hospital, etc. Second Edition, 1923, William Wood and Company, New York.

HUMAN PROTOZOOLOGY. By Robert W. Hegner, Ph.D., Professor of Protozoology, and William H. Taliaferro, Ph.D. Associate Professor in the School of Hygiene and Public Health of the Johns Hopkins University. 1924, Macmillan Co. New York.

LIFE SHORTENING HABITS AND REJUVENATION. By Arnold Lorand, M.D. Carlsbad, Czecho-Slovakia. 1923, F. A. Davis Company, Philadelphia.

REJUVENATION, and the Prolongation of Human Efficiency. Experiences with the Steinach Operation on Man and Animals. By Dr. Paul Kammerer. With an introduction by Dr. Harry Benjamin. Illustrated. 1923, Boni and Liveright, New York.

MECHANISM AND PHYSIOLOGY OF SEX DETERMINATION. By Richard Goldschmidt, Director of the Kaiser Wilhelm Institute for Biology, Berlin-Dahlheim. Translated by William J. Dakin, Professor of Zoology, University of Liverpool. With 113 Illustrations. 1923, George H. Doran Company, New York.

MANUEL D'EMBRYOLOGIE HUMAINE. Par J. Vignoli, Aide d'Anatomie et de Physiologie a l'Ecole de Medecine de Marseille. 196 figures, 8 planches couleurs. 1923, A. Maloine & Fils, Paris.

LOCAL ANESTHESIA. Its scientific basis and practical use. By Professor Dr. Heinrich Braun, Director of the kgl. Hospital in Zwickau, Germany. Translated

and edited by Malcolm L. Harris, M.D., Professor of Surgery, Chicago Polyclinic, etc. Second American from the sixth revised German edition. With 231 illustrations in black and colors. 1924, Lea & Febiger, Philadelphia and New York.

TOPOGRAPHISCHE ANATOMIE DRINGLICHER OPERATIONEN. Von J. Tandler, Professor der Anatomie an der Universitaet Wien. Zweite, verbesserte Auflage. Mit 56 zum grossen Teile farbigen Abbildungen im Texte. 1923, Julius Springer, Berlin.

OPERATIVE GYNAEKOLOGIE. Von Doederlein-Kroenig. Bearbeitet von Albert Doederlein, Professor der Geburtshilfe und Gynaekologie, Direktor der Universitaets-Frauenklinik in Muenchen. Fuenfte Auflage. Mit 443 teils farbigen Abbildungen und 16 farbigen Tafeln. 1924, Georg Thieme, Leipzig.

DIE ROENTGENBEHANDLUNG DES UTERUSKARZINOMS. Von Dr. Hermann Wintz, Professor, Direktor der Universitaets-Frauenklinik in Erlangen. Mit 50 Lichtdrucktafeln. 1924, Georg Thieme, Leipzig.

LEHRBUCH DER UROLOGIE. Von Dr. Leopold Casper, Professor A.D. Universitaet Berlin. Vierte, neu bearbeitete und vermehrte Auflage. Mit 225 teils farbigen Abbildungen und 2 farbigen Tafeln. 1923, Urban & Schwarzenberg, Berlin und Wien.

DISEASES OF THE RECTUM AND COLON, and their surgical treatment. By P. Lockhart-Mummery, Senior Surgeon to St. Mark's Hospital for Cancer, Fistula, and other diseases of the Rectum. 1923, William Wood and Co., New York.

BIOLOGIE UND PATHOLOGIE DES WEIBES. Handbuch der Frauenheilkunde und Geburtshilfe. Herausgegeben von Josef Halban, Wien, und Ludwig Seitz, a.M. Lieferungen: Drei, Vier und Fuenf. 1924, Urban & Schwarzenberg, Berlin und Wien.

TRAITE PRATIQUE DE CYSTOSCOPIE ET DE CATHETERISME URÉTERAL. Par C. Marion, Professeur, Chirurgien de l'hôpital Lariboisière, et M. Heitz-Boyer, Professeur de Chirurgie des voies urinaires, Chirurgien de l'hôpital St. Louis. Deuxieme edition. Entièrement refondue. Avec 60 planches hors texte en noir et en couleurs. 1923, Masson et Cie., Paris.

LOCAL ANAESTHESIA, METHODS AND RESULTS IN ABDOMINAL SURGERY. By Professor Dr. Hans Finsterer, Vienna. With 42 Illustrations. Authorized English Version by Joseph P. F. Burke, of Buffalo, N. Y. 1923, Reiman Company, New York.

CANCER DE L'INTESTIN. Par J. Okinczyk, Professeur agrégé à la faculté de Médecine de Paris, chirurgien des hôpitaux. 1924. Gaston Doin, Paris.

CANCERS DU REIN, DE LA GLANDE SURRÉNALE ET DE VOISSUBINAIRES SUPÉRIEURES. Par P. Lecène, professeur à la faculté de Médecine de Paris, Chirurgien de l'hôpital St. Louis, et G. Wolfionn, ancien interne des hôpitaux. 1924. Gaston Doin, Paris.

LEHRBUCH DER SPEZIELLEN PATHOLOGISCHEN ANATOMIE FÜR STUDIERENDE UND ÄRZTE. Von Dr. Eduard Kaufmann, Professor der allg. pathologischen Anatomie, etc. der Universität Göttingen. Siebente und achte, vollständig neu bearbeitete und vermehrte Auflage. Zwei Bände. Mit 393 Abbildungen im Text und auf vier farbigen Tafeln. Walter de Gruyter & Co. Berlin und Leipzig, 1912.

INDEX

A

- Abderhalden reaction, the, Smith, F. C., and Shipley, V. T., 24
- Abdominal surgery, the renaissance of; the passing of the gynecologist, Deaver, John B., 299
- Abelheim, Postpartum hemorrhage, (Abst.), 119
- Ablatio placentae, is cesarean section justifiable in? Polak, John O., 384, 475
- Abortion and sterilization, some indications for therapeutic, Winans, (Abst.), 252
the economic aspects of, Schumann, Edward A., 484
- American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Transactions of Thirty-sixth Annual Meeting, 206, 321, 473, 611, 719
- Amniotic fluid, the uric acid content of human, Williams, J. L., and Barger, J. A., 406
- Amolsch, Arthur L., (with Davis, James E., and Kellog, B. V.), Anatomical and clinical studies upon 875 placentae, 637
- Analgesia, posthypnotic birth, Kogerer, (Abst.), 366
- Anatomical and clinical studies upon 875 placentae, Davis, James E., Kellog, B. V., and Amolsch, Arthur L., 637
- Anderson, J. W., High percentage of abnormal obstetric cases in general practice, (Abst.), 113
- Anencephaly, report of a case of, diagnosis before onset of labor, Campbell, A. M., and Willits, P. W., 104
- Anesthesia in obstetrics, the value of sacral nerve block, Bonar and Meeker, (Abst.), 369
in operative gynecology, aims and limitations of local, Zimmermann, (Abst.), 368
obstetric analgesia and, a consideration of nitrous oxide-oxygen and various combined methods, Danforth and Davis, (Abst.), 367
regional, of the uterus, Cotte, G., (Abst.), 369
the maintenance of obstetric, by infundibulum and chloroform, (Abst.), Martin, A. F., 367
the use of local, in handling septic conditions within the abdomen, Farr, Robert E., 152, 213

- Anesthetics and analgesics in labor, Greenwood, W. O., (Abst.), 364
- Appendicitis, cutting the ileocecal fold as a routine measure in the operation for, Chandler, George F., 149, 211
- Appendix, carcinoma of base of, report of a case of, Tate, M. A., 291, 325
- Applegate, J. C., Rational obstetrics from the teaching viewpoint, 181
- Arens, (with Stein), Roentgenograms of the fetal skeleton as a positive sign of pregnancy, (Abst.), 502
- Atresia of the vagina, report of a case of acquired, and the operative result, Grad, H., 469
- Aub, (with Taylor), The effect of body tissues other than the thyroid upon the basal metabolic rate, (Abst.), 748

B

- Babeock, W. Wayne, Chemical hysterectomy, 693, 722
- Bailey, Harold, The report of the Committee on Regulation of Conception, 339
The serum treatment of puerperal sepsis, 658, 727
- Bainbridge, W. S., Duplex uterus with multiple pregnancy, 285, 321
- Barger, J. A., (with Williams, J. L.), The uric acid content of human amniotic fluid, 406
- Basal metabolic rate, the effect of body tissues other than the thyroid upon the, Aub and Taylor, (Abst.), 748
- Baumann, On the question of artificial impregnation, (Abst.), 250
- Beck, Alfred C., The conservative treatment of eclampsia, 677, 730
- Belot, J., Sterility and x-rays, (Abst.), 251
- Bishop, Eliot, Solid tumors of the ovary; their clinical consideration and treatment, 576
(with Giest, S. H.), Symposium on solid ovarian tumors and their treatment, 621
- Bishop, K. S., (with Evans), On the relations between fertility and nutrition, (Abst.), 243
Existence of a hitherto unknown dietary factor essential for reproduction, (Abst.), 244

- Blamontier, Kraurosis vulvae and exophthalmic goiter, (Abst.), 747
- Blindness wanted in surgery, Morris, R. T., 166, 216
- Block, F. B., (with Clark, J. C.), Relative values of irradiation and radical hysterectomy for cancer of the cervix, 625
- Bonar, (with Meeker), The value of sacral nerve block anesthesia in obstetrics, (Abst.), 369
- Books received, 371, 755
- Bradley, R. L., Results of intermittent aspiratory hyperemia in gynecology with a report of one hundred and twenty-three cases, 195
- Brodhead, G. L., Dry labor, a study of 182 private cases, 332
- Brown, C. H., Abdominal pregnancy with favorable outcome at term, 101
- Buist, R. C., A note on the early recognition and corrective treatment of occipito-posterior presentations, (Abst.), 118
- Bunzel, E. Everett, A statistical review of the toxemias of pregnancy, 686, 730
- C
- Campbell, A. M., (with Willits, P. W.), Report of a case of anencephaly-diagnosis before onset of labor, 104
- Cancer carriers, the clinical significance of chemical and serum analyses of the blood of uterine, subjected to measured radiation doses, Schmitz, Henry, 449, 480
- Carr, W. L., (with Ratner, B.), The results of follow-up work with infants in a maternity hospital, 75
- Cervix and fundus, a study of three hundred cases, private patients, six weeks or longer postpartum, with reference to the condition of the pelvic floor, Lankford, B., 275, 323
- cauterization of the uterine, Kelly, H. A., 627
- relative values of irradiation and radical hysterectomy for cancer of the, Clark, J. G., and Block, F. B., 543, 625
- report of a case of a large interstitial fibroma of, operations, Hall, Rufus B., 709
- uteri, the repair of birth lacerations of the, Enge, L. A., 16
- Cesarean section, extraperitoneal, (gastrocytotomy) in presumably infected and mismanaged cases of prolonged labor, Davis, A. B., 373, 473
- Chandler, Geo. F., Cutting the ileocecal fold as a routine measure in the operation of appendicitis, 149, 211
- Chapman, W. D., Maternal and infant welfare without governmental bureaucracy, 314
- Chemical hysterectomy, Babcock, W. Wayne, 693, 722
- Childbirth, painless, Konwer, (Abst.), 364
- septic infections following, Vander Veer, E. A., 280, 326
- Clark, John G., (with Block, F. B.), Relative values of irradiation and radical hysterectomy for cancer of the cervix, 543, 625
- Coccyx, labor injuries of the, and their treatment, Hirst, J. C., and Wachs, C., 199
- Colics, R., The artificial pneumoperitoneum in gynecology, (Abst.), 502
- Collective Reviews:
- Essentials in roentgentherapy of interest to clinicians with a consideration of its application in gynecology, Robinson, M. R., 487, 630
- New books, Frank, Robert T., 234
- Operations for permanent enlargement of the contracted bony pelvis in women, Polak, John Osborn, and Phelan, George W., 739
- The application of x-ray to obstetrics and gynecology, Spillman, R., 110
- The Kielland Forceps, Greenhill, J. P., 349
- College, hospital, medical student, the, Dickinson, G. K., 259
- Conception, the report of the Committee on the Regulation of, Bailey, Harold, 339
- Contraceptive substances, the biological behavior of spermatozoa to, Steinhäuser, W., (Abst.), 250
- Corpus luteum, the pathological anatomy of the, (abscess, cyst, hematoma, and neoplasm), Novak, Emil, and TeLinde, Richard, W., (Abst.), 749
- Cotte, G., Regional anesthesia of the uterus, (Abst.), 369
- Couch, Fashionable midwifery, (Abst.), 113
- Crile, George W., Carcinoma of the uterus, 528
- (with Portmann, U. V., and Jones, T. E.), Symposium on the relative rôle of surgery, x-ray and radium in the treatment of carcinoma of the uterus, 611
- Crossen, R., (with Schwarz, O. H.), Endometrial tissue in the ovary, 595, 618
- Curtage, diagnostic, Driesen, (Abst.), 504

D

- Danforth, (with Davis), Obstetric analgesia and anesthesia, a consideration of nitrous oxide-oxygen and various combined methods, (Abst.), 367
- Davidson, L. T., (with Krebs, O. S.), The newborn service in a university hospital, 33
- Davis, (with Danforth), Obstetric analgesia and anesthesia, a consideration of nitrous oxide-oxygen and various combined methods, (Abst.), 367
- Davis, A. B., Extraperitoneal cesarean section (gastroelytrotomy) in presumably infected and mismanaged cases of prolonged labor, 373, 473
- Davis, James E., Obituary—William Whitford, 737
(with Kellog, B. V., and Amolsch, Arthur L.), Anatomical and clinical studies upon 875 placentae, 637
- Deaver, John B., The renaissance of abdominal surgery; the passing of the gynecologist, 299
- Delivery, leg holders for, Piper, E. B., 226
- Denis, W., (with King, E. L.), A chemical study of the inorganic constituents of blood in normal and abnormal pregnancy, 253
- DeRouville, (with Sappey), The action of the lutein cells of the ovary in certain uterine hemorrhages, (Abst.), 748
- Deucher, W. G., Digital examination of the uterine cavity, (Abst.), 503
- Diabetes mellitus in pregnancy, Wiener, Herbert J., 710
- Diagnosis in surgical infections, blood sedimentation test as an aid in, Friedlaender, 125
- Dickinson, G. K., The college, the hospital, the medical student, 259
- Dickinson, R. L., A case of obstinate diabetic eczema of vulva, rapid cure by insulin administration, with return of menstruation at fifty, 338
- Dieckmann, W. J., (with Krebs, O. S.), The Rosenthal liver function test in obstetrics, 89
- Dietary factor essential for reproduction, existence of a hitherto unknown, Evans, H. M., and Bishop, K. S., (Abst.), 244
- Diverticula and diverticulitis, Lynch, J. M., 269, 321
- Dorland, Report of a case of ruptured uterus resulting from the use of pituitary extract, (Abst.), 122
- Double uterus, double vagina and double Douglas' pouch, Hewson, A., 222

- Driessen, Diagnostic curettage, (Abst.), 504
- Dry labor, a study of 182 private cases, Brodhead, G. L., 332
- Dysmenorrhea, concerning the functional therapy of, Ludwig, Fritz, (Abst.), 748
- Dystocia due to constriction of one thigh by cervix in a cephalic presentation, Greenhill, (Abst.), 117
uterine, the necessity of uniformity in the nomenclature of, Zarate, E., (Abst.), 117

E

- Eclampsia, conservative treatment of, Beck, Alfred C., 677, 730
is it a biological necessity? Grulizit, O. M., 588, 620
- Eichel, Otto R., A preliminary report of statistical study of puerperal sepsis, 667, 724
- Emerick, Sterilization of the mentally unfit, (Abst.), 252
- Emge, L. A., The repair of birth lacerations of the cervix uteri, 16
- Endocrinology, (Abstracts), 745
- Evans, H. M., (with Bishop, K. B.), On the relations between fertility and nutrition, (Abst.), 243
Existence of a hitherto unknown dietary factor essential for reproduction, (Abst.), 244
- Examination, digital, of the uterine cavity, Deucher, W. G., (Abst.), 503
- Exploration, the diagnostic value of digital, of the uterine cavity in cases of anomalous bleeding, Hesse, W., (Abst.), 504

F

- Fabre, Maurice, (with Mosse, S.), Extract of hypophysis in metrorrhagia, (Abst.), 747
- Farr, R. E., The use of local anesthesia in handling septic conditions within the abdomen, 152, 213
- Faust, Inversion of the uterus, (Abst.), 123
- Fertility and nutrition, on the relations between, Evans, H. M., and Bishop, K. S., (Abst.), 243
- Fibroma of cervix, report of a case of a large interstitial—operations, Hall, Rufus B., 709
- Fleurent, H., Consideration of some cases of rupture of the uterus, (Abst.), 122
- Follow-up work with infants in a maternity hospital, the results of, Carr, W. L.; and Ratner, B., 73
- Frank, Robert T., New books, (Collective Review), 234

- Friedlaender, B., Blood sedimentation test as an aid in diagnosis of surgical infections, 125
- Frozen sections through uterus of woman dying during third stage of labor, illustrating mechanism of placental separation and extrusion, Titus, Paul, and Andrews, V. L., 396, 478
- through uterus of woman dying from central placenta previa, following Braxton-Hicks version, Titus, Paul, and Andrews, V. L., 396, 478
- Furniss, H. D., Fulguration of Hunner ulcers, 288, 323
- the Rubin test simplified, (Abst.), 244
- Fürst, W., The value of rectal examinations during labor and their limitations compared to the usual vaginal examinations, (Abst.), 114
- ### G
- Gas inflation, transuterine, Peterson-Cron (Abst.), 502
- Geist, S. H., Solid ovarian tumors; their pathology, 567
- (with Harris), Experimental investigations of the value of the various commercial ovarian extracts, (Abst.), 754
- Gestation, the time for operation in ectopic, Welton, T. S., 158, 213
- with unusual symptoms, a case of interstitial ectopic, Vineberg, H. N., 228
- Gibbons, R. A., Sterility with reference to the State, (Abst.), 243
- Gillespie, Relief of pain in labor, (Abst.), 367
- Gobel, M., (with Schilling, E.), The diagnosis of pregnancy by the injection of phloridzin, (Abst.), 499
- Goff, B. H., An analysis of wound union in 3,000 abdominal incisions from the clinic of the Woman's Hospital, 342
- Goiter, Kraurosis vulvae and exophthalmic, Blamoutier, (Abst.), 747
- toxic, pelvic findings in one hundred cases of, Hertzler, (Abst.), 747
- Gordon, A., Meningeal hemorrhages of the newborn and their remote consequences, 462, 481
- Graafian follicle cyst, abdominal hemorrhage from ruptured, Hadden, D., 600, 620
- Grad, H., Report of a case of acquired atresia of the vagina and the operative result, 469
- Graff, The treatment of sterility in women, (Abst.), 215
- Greenhill, J. P., Dystocia due to constriction of one thigh by cervix
- Greenhill, J. P.—Cont'd
- in a cephalic presentation, (Abst.), 117
- The Kielland forceps, (Collective Review), 349
- Greenwood, W. O., Anesthetics and analgesics in labor, (Abst.), 364
- Gruhitz, O. M., Eclampsia, is it a biologic necessity? 588, 620
- Guggenberger, J., The viability of human spermatozoa *in vitro*, (Abst.), 249
- Gynecologic diagnosis, pneumoperitoneum of the pelvis as an aid to, Impery, (Abst.), 503
- Gynecological operations, the value of certain, Tuttle, H. K., 43
- Gynecology, diagnostic value of sedimentation time of the red corpuscles in, Molnar, (Abst.), 501
- results of intermittent aspiratory hyperemia in, Bradley, R. L., 195
- the artificial pneumoperitoneum in, Coliez, R., (Abst.), 502
- ### H
- Hadden, David, Abdominal hemorrhage from ruptured Graafian follicle cyst, 600
- Two cases of recurrent cyst adenoma of ovary, 598
- Hall, Rufus B., Report of a case of a large interstitial fibroma of cervix—operations, 709
- Hamilton, The problem of posterior positions, (Abst.), 118
- Harper, P. T., The occiput posterior, 53
- Harris, (with Geist), Experimental investigations of the value of various commercial ovarian extracts, (Abst.), 754
- Hartman, C., Observations on the viability of the mammalian ovum, 40
- Hawkins, W. H., Two cases of inversion of the uterus, 331
- Hellendall, H., Pantopon versus laudanum-scopolamine ether narcosis, (Abst.), 368
- Hematocolpos in a child of six weeks, Moench, G. L., 471
- Hemorrhage, postpartum, Abelheim, (Abst.), 119
- the treatment of, Tweedy, (Abst.), 119
- Hertzler, Pelvic findings in one hundred cases of toxic goiter, (Abst.), 747
- Hesse, W., The diagnostic value of digital exploration of the uterine cavity in cases of anomalous bleeding, (Abst.), 594
- Hewson, A., Double uterus, double vagina and double Douglas' pouch, 222
- Hoyd, C. H., (with MacNeal, W. J., and Killian, J. A.), Hepatitis in its relation to inflammatory disease of the abdomen, 413, 479

- Hirschman, N., The "standardized-dosage" method of using scopolamine-morphine during labor, (Abst.), 364
- Hirst, J. C., (with Long), Ingestion glycosuria, an aid to early diagnosis of pregnancy, (Abst.), 501
(with Wachs, C.), Labor injuries to the coccyx and their treatment, 199
- Horsley, J. S., Report of a case of adenocarcinoma of the body of the uterus, 106
- Hospitals, reflections upon, Keefe, John W., 144, 206
- Hunner ulcers, fulguration of, Furniss, H. D., 288, 323
- Hysterectomy, chemical, Babcock, W. Wayne, 693, 722

I

- Impey, Pneumoperitoneum of the pelvis as an aid to gynecologic diagnosis, (Abst.), 503
- Impregnation, on the question of artificial, Baumann, (Abst.), 250.
- Inflammatory disease of the abdomen, hepatitis in its relation to, Heyd, MacNeal and Killian, 413, 479
- Interstitial gland in the ovary of the newborn, Matsuno, (Abst.), 751
glands, the development of the, in the testicle and ovary, Lahm, W., (Abst.), 751

J

- Jacoby, The effect of the placenta on menstruation, (Abst.), 754
- Jaffe, J. K., A new method of teaching pelvic diagnosis by means of manikins, 189
- Jones, T. E., The rôle of radium in the treatment of carcinoma of the uterus, 541
(with Crile and Portmann), Symposium on the relative rôle of surgery, x-ray and radium in the treatment of carcinoma of the uterus, 611
- Judd, A. M., New physical sign in interrupted pregnancy, 231

K

- Keefe, John W., Reflections upon hospitals, 144, 206
- Keller, R., Difficulties in the diagnosis of rupture of the uterus, (Abst.), 122
- Kellog, B. V., (with Davis, James E., and Amolsch, Arthur L.), Anatomical and clinical studies upon 875 placentae, 637

- Killian, J. A., (with Heyd and MacNeal), Hepatitis in its relation to inflammatory disease of the abdomen, 413, 479
- King, E. L., (with Denis, W.), A chemical study of the inorganic constituents of blood in normal and abdominal pregnancy, 253
uric acid in the blood in the toxemias of pregnancy, 409
- Kogerer, Posthypnotic birth analgesia, (Abst.), 366
- Köster, Phloridzin in the diagnosis of pregnancy, (Abst.), 499
- Kouwer, Painless childbirth, (Abst.), 364
- Krebs, O. S., (with Davidson, L. T.), The newborn service in a university hospital, 33
(with Dieckmann, W. J.), The Rosenthal liver function test in obstetrics, 89
(with Schwarz, O. H.), Scopolamine-morphine semimarcosis, (Abst.), 364
- Kreis, John, Clinical researches of the sympathetic and parasympathetic system in relation to menorrhagia, (Abst.), 745
- Krönig, W., (with Schönholz, L.), Medicinal and hypnotic twilight sleep in obstetrics, (Abst.), 366
- Kross, I., Chronic ulcer of vagina of undetermined origin, 103
Uterine secretion: a brief investigation of its nature in the human being, 310
- Kuhlmann, One thousand cases of obstetrics as seen by a country practitioner, (Abst.), 113
- Kupferberg, Conduct of labor without vaginal examinations, (Abst.), 115
- Küstner, Renal diabetes during pregnancy and its dependence upon the glands of internal secretion, (Abst.), 500

L

- Labhardt, A., On the question of rectal examination in obstetrics, (Abst.), 114
- Labor, acute dilatation of the stomach after, Van der Peik, (Abst.), 121
conduct of, without vaginal examinations, Kupferberg, (Abst.), 115
contraction ring in the first stage of, clinical observations on the, Lange-Nielson, (Abst.), 117
disturbances in the third stage of, Strecker, J., (Abst.), 119
hydrostatic bag for the induction of, Lee, G. H., 319
pituirrin in the third stage of, Seides, (Abst.), 119

Labor—Cont'd

- relief of pain in, Gillespie, (Abst.), 367
- the use of pituitary extract in, Steinberg, B., 82
- Lahm, W., The development of the interstitial gland in the testicle and ovary, (Abst.), 751
- Lange-Nielson, Clinical observations on the contraction ring in the first stage of labor, (Abst.), 117
- Lankford, B., A study of three hundred cases, private patients, six weeks or longer postpartum, with reference to the condition of the pelvic floor, cervix and fundus, 275, 323
- Lee, G. H., A hydrostatic bag for the induction of labor, 319
- Linsenmeier, The x-ray as treatment for sterility, (Abst.), 249
- Long and Hirst, Ingestion glycosuria an aid to early diagnosis of pregnancy, (Abst.), 501
- Ludwig, Fritz, Concerning the functional therapy of dysmenorrhea, (Abst.), 748
- Lynch, J. M., Diverticula and diverticulitis, 269, 321

M

- MacNeal, W. J., (with Heyd and Killian), Hepatitis in its relation to inflammatory disease of the abdomen, 413, 479
- Mellroy, The ovum as an internal secretory organ, (Abst.), 749
- McPherson, R., Treatment of placenta previa, 403, 477
- Macomber, D., Defective diet as a cause of sterility, final report of fertility studies in the Albino rat, (Abst.), 244
- Maier, Correction of sterility, (Abst.), 247
- Manton, Report of two cases of acute inversion of the uterus, (Abst.), 123
- Martin, A. F., The maintenance of "obstetric anesthesia" by infundibulin and chloroform, (Abst.), 367
- Maternal and infant welfare without government bureaucracy, Chapman, W. D., 311
- morbidity and mortality in the United States, Mosher, Geo. C., 294, 326
- welfare, report of the Committee on, to the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, 1923, Mosher, George C., 601
- Matsumo, the interstitial gland in the ovary of the newborn, (Abst.), 751

- Meeker, (with Bonar), The value of sacral nerve block anesthesia in obstetrics, (Abst.), 369
- Membranes, adhesion and retention of the, clinical observation on, Willmore, (Abst.), 116
- dissociation of the, Vermelin, (Abst.), 116
- is early rupture of the, desirable? Wijsenbeck, (Abst.), 115
- Menorrhagia, clinical researches of the sympathetic and parasympathetic system in relation to, Kreis, Jules, (Abst.), 745
- Menstruation, the effect of the placenta on, Jacoby, (Abst.), 754
- the use of x-ray therapy in disturbed, Rongy, A. J., (Abst.), 169, 217
- Metrorrhagia, extract of hypophysis in, Mosse, S., and Fabre, Maurice, (Abst.), 747
- Midwifery, fashionable, Conch, (Abst.), 113
- Mills, L., The significance of ocular changes occurring in association with preeclamptic symptoms, 304
- Moench, G. L., Hematocolpos in a child of six weeks, 471
- Molnar, Diagnostic value of sedimentation time of the red corpuscles in . . . t.), 501
- Morris, . . . wanted in surgery, 166, 216
- Mosher, George C., Maternal morbidity and mortality in the United States, 294, 326
- Report of the Committee on Maternal Welfare to the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, 1923, 601
- Mosse, S., (with Fabre, Maurice). Extract of hypophysis in metrorrhagia, (Abst.), 747
- Muret, Concerning postpartum obstetrical shock, (Abst.), 120

N

- New books, Frank, Robert T., (Collective review), 234
- Newborn, meningeal hemorrhages of the, and their remote consequences, Gordon A., 462, 481
- service in a university hospital, the, Davidson and Krebs, 33
- the interstitial gland in the ovary of the, Matsumo, (Abst.), 751
- New York Academy of Medicine, Section on Obstetrics and Gynecology, Transactions of, 331, 739
- New York Obstetrical Society, Transactions of, 227, 338, 621, 721
- Norris, C. C., (with Vogt, M. E.), Carcinoma of the body of the uterus with report of 115 cases, 550, 625

- Novak, An appraisal of ovarian therapy, (Abst.), 753
 Diagnosis of the patency of the tubes by the Rubin test, (Abst.), 244
- Novak, Emil, (with TeLinde, Richard W.), The pathological anatomy of the corpus luteum, (abscess, cyst, hematoma, and neoplasm), (Abst.), 749
- O
- Obituary—William Whitford, 737
- Obstetric cases in general practice, high percentage of abnormal, Anderson, J. W., (Abst.), 113
- Obstetrical shock, concerning postpartum, Muret, (Abst.), 120
 Society of Philadelphia, Transactions of, 222, 481, 625
- Obstetrics and gynecology, the pituitary gland in its relation to, Williamson, Herbert, (Abst.), 746
 medicinal and hypnotic twilight sleep in, Krönig, W., and Schönholz, L., (Abst.), 366
 one thousand cases of, as seen by a country practitioner, Kuhlmann, (Abst.), 113
 rational, from the teaching viewpoint, Applegate, J. C., 181
 the Rosenthal liver function test in, Krebs and Dieckmann, 89
- Occipito-posterior presentations, a note on the early recognition and corrective treatment of, Buist, R. C., (Abst.), 118
- Occiput posterior, the, Harper, Paul T., 53
- Operations for permanent enlargement of the contracted bony pelvis in women, Polak, John Osborn, and Phelan, George W., (Collective Review), 739
- Organotherapy, experimental investigations of the value of, Zondek, (Abst.), 753
- Ovarian extracts, experimental investigations of the value of the various commercial, Geist and Harris, (Abst.), 754
 fibroma, sarcoma and carcinoma, Polak, John O., 621
 function, studies of, Schickele, G., (Abst.), 750
 hemorrhages, clinical investigations of the value of organotherapy in, Stickel and Zondek, (Abst.), 752
 therapy, an appraisal of, Novak, (Abst.), 753
 tumors, solid, their pathology, Geist, Samuel H., 567
 symposium on solid, and their treatment, Geist and Bishop, 621

- Ovary as an internal secretory organ, McIlroy, (Abst.), 749
 mammalian, observations on the viability of the, Hartman, C., 40
- Ovary, cystadenoma of, two cases of recurrent, Hadden, D., 598
 endometrial tissue in the, Schwarz, O. H., and Crossen, R., 505, 618
 solid tumors of the, their clinical consideration and treatment, Bishop, Eliot, 576
 two cases of recurrent cystadenoma of, Hadden, D., 598
- Oxygen inflation of the peritoneal cavity for radiography purposes, Roberts, (Abst.), 502

P

- Pains, the treatment of weak uterine, Sachs, E., (Abst.), 118
- Pancreatitis, acute, Smead, L. F., 431, 478
- Pantopon versus laudanum-scopolamine ether narcosis, Hellendall, H., (Abst.), 368
- Pedersen, V. C., A virgin bivalve speculum (adult length), 108
- Pelvic diagnosis, a new method of teaching, by means of manikins, Jaffe, J. K., 189
- Pelvis, contracted bony, operations for permanent enlargement of the, in women, Polak, John Osborn, and Phelan, George W., (Collective Review), 739
- Peterson, (with Cron), Transuterine gas inflation, (Abst.), 502
- Phelan, George W., (with Polak, John Osborn), Operations for permanent enlargement of the contracted bony pelvis in women, (Collective Review), 739
- Philips, Prolapse of the spontaneously inverted puerperal uterus, (Abst.), 123
- Piper, E. B., Leg holders for delivery, 226
- Pituitary extract in labor, the use of, Steinberg, B., 82
 gland in its relation to obstetrics and gynecology, Williamson, Herbert, (Abst.), 746
 reactions to extracts of the posterior, in pregnancy, Volpe, C., (Abst.), 746
- Pituitrin in the third stage of labor, Seides, (Abst.), 119
- Placenta previa, treatment of, McPherson, Ross, 403, 477
 the effect of the, on menstruation, Jacoby, (Abst.), 754
- Placentae, anatomical and clinical studies upon 875, Davis, James E., Kellogg, B. V., and Amolsch, Arthur L., 739

- Placental rests, retention of, at full term delivery, Zangemeister, (Abst.), 120
- Placentaoptone, the effect of the, Puppel, Ernst, (Abst.), 754
- Polak, J. O., Is cesarean section justifiable in ablatio placentae? 384, 475
- Ovarian fibroma, sarcoma and carcinoma, 621
(with Phelan, George W.), Operations for permanent enlargement of the contracted bony pelvis in women, (Collective Review), 739
- Portmann, U. V., Radiation therapy of cancer of the uterus, 533
(with Crile and Jones), Symposium on the relative rôle of surgery, x-ray and radium in the treatment of carcinoma of the uterus, 611
- Postanesthetic complications, some observations on, Smith, G. F. R., (Abst.), 370
- Posterior positions, the problem of, Hamilton, (Abst.), 118
- Preeclamptic symptoms, the significance of ocular changes occurring in association with, Mills, L., 304
- Pregnancies, normal and abnormal, the roentgen ray diagnosis, Speidel, Edward, and Turner, Henry H., 697, 719
- Pregnancy, abdominal, with favorable outcome at term, Brown, C. H., 101
a chemical study of the inorganic constituents of blood in normal and abnormal, Denis, W., and King, E. L., 253
a statistical review of the toxemias of, Bunzel, E. Everett, 686, 730
carcinoma of the cervix associated with, Schilling, N., 440
diabetes mellitus in, Wiener, Herbert J., 710
duplex uterus with multiple, Bainbridge, W. S., 285, 321
glycosuria of, Rommert, (Abst.), 500
further observations in renal, Schneidermann, H., 177
ingestion glycosuria as aid to early diagnosis of, Long and Hirst, (Abst.), 501
new physical sign in interrupted, Judd, Albert M., 231
ovarian, with the report of a case, Sutton, L. A., 1
phloridzin in the diagnosis of, Köster, (Abst.), 499
preventive, a useful, Past, (Abst.), 251
reactions to extracts of the posterior pituitary in, Volpe, C., (Abst.), 746
renal diabetes during, and its dependence upon the glands of internal secretion, Küstner, (Abst.), 500
- Pregnancy—Cont'd
roentgenograms of the fetal skeleton as a positive sign of, Stein and Arens, (Abst.), 502
the diagnosis of, by the injection of phloridzin, Schilling and Gobel, (Abst.), 499
the diagnostic value of adrenalin glycosuria in, Küstner, (Abst.), 500
the renal glycosuria of, as an early symptom of the gravid state, Ronbitschek, R., (Abst.), 498
toxemias of, uric acid in the blood in the, King and Denis, 409
- Pregnant women, the sedimentation of red blood cells in, Vignes, (Abst.), 501
- Procidencia, results of radical surgical treatment of, by the Murphy, Collins and Jackson operations, Sloan, E. P., 703, 720
- Puerperal sepsis, a preliminary report of a statistical study of, Eichel, Otto R., 667, 724
serum treatment of, Bailey, Harold, 658, 727
- Puppel, Ernst, The effect of the placentaoptone, (Abst.), 754
- Past, A useful pregnancy preventive, (Abst.), 251

R

- Ratner, B., (with Carr, W. L.), The results of follow-up work with infants in a maternity hospital, 73
- Rectal examination during labor, Van Blomestein, (Abst.), 114
in obstetrics, on the question of, Labhardt, A., (Abst.), 114
examinations, the value of, during labor and their limitations compared to the usual vaginal examinations, Fürst, W., (Abst.), 114
- Reder, F., Lesions of the cervical stump of a supravaginally ablated uterus, 173, 218
- "Regulation of conception," summary of the answers to the questionnaire submitted to the members of the New York Obstetrical Society on the, 266
- Roberts, Oxygen inflation of the peritoneal cavity for radiographic purposes, (Abst.), 502
- Robinson, M. R., Essentials in roentgen-therapy of interest to clinicians with a consideration of its application in gynecology, 487, 639
- Roentgen ray diagnosis of normal and abnormal pregnancies, Speidel, Edward, and Turner, Henry H., 697, 719
- Rommert, Glycosuria of pregnancy, (Abst.), 500

- Rongy, Primary sterility, (Abst.), 246
 The use of x-ray therapy in disturbed menstruation, 169, 217
 Roubitschek, R., The renal glycosuria of pregnancy as an early symptom of the gravid state, (Abst.), 498
 Rubin test, diagnosis of the patency of the tubes by the, Novak, (Abst.), 244
 simplified, the, Furniss, (Abst.), 244

S

- Sachs, E., The treatment of weak uterine pains, (Abst.), 118
 Sappey, (with DeRouville), The action of the lutein cells of the ovary in certain uterine hemorrhages, (Abst.), 748
 Schickele, G., Studies of ovarian function, (Abst.), 750
 Schilling, E., (with Gobel, M.), The diagnosis of pregnancy by the injection of phloridzin, (Abst.), 499
 Schilling, N., Carcinoma of the cervix associated with pregnancy, 440
 Schmidt, H. R., Sterility in women and the outlook of its treatment, (Abst.), 247
 Schmitz, H., The clinical significance of chemical and serum analyses of the blood of uterine cancer carriers subjected to measured radiation doses, 449, 480
 Schneiderman, H., Further observations in renal glycosuria of pregnancy, 177
 Schönholz, L., (with Krönig, W.), Medicial hypnotic twilight sleep in obstetrics, (Abst.), 366
 Selhumann, E. A., The economic aspects of abortion, 484
 Schwarz, O. H., (with Crossen, R.), Endometrial tissue in the ovary, 505, 618
 (with Krebs, O. S.), Scopolamine-morphine seminarcosis, (Abst.), 364
 Scopolamine poisoning, is morphia an antidote in? Strube, (Abst.), 365
 Scopolamine-morphine during labor, the "standardized-dosage" method of using, Hirshman, N., 364
 Seides, Pituitrin in the third stage of labor, (Abst.), 119
 Selected Abstracts:
 Anesthesia in obstetrics and gynecology, 364
 Complications of labor and their prevention, 113
 Endocrinology, 745
 Newer diagnostic methods in obstetrics and gynecology, 498
 Sterility, 243

- Seminarcosis, scopolamine-morphine, Schwarz, O. H., and Krebs, O. S., (Abst.), 364
 Septicemia, intrapartum and postpartum streptococci, of extrapelvic origin, Wolfe, S. A., 97
 Serum treatment of puerperal sepsis, Bailey, Harold, 658, 727
 Shipley, V. T., (with Smith, F. C.), The Abderhalden reaction, 24
 Sloan, E. P., Results of radical surgical treatment of procidentia by the Murphy, Collins and Jackson operations, 703, 720
 Smead, L. F., Acute pancreatitis, 431, 478
 Smith, F. C., (with Shipley, V. T.), The Abderhalden reaction, 24
 Smith, G. F. R., Some observations on postanesthetic complications (Abst.), 370
 Speculum, a virgin bivalve, Pedersen, 108
 Speidel, Edward, (with Turner, Henry II.), The roentgen ray diagnosis of normal and abnormal pregnancies, 697, 719
 Sperm immunity, new facts and problems in, Vogt, E., (Abst.), 249
 Spermatozoa, the viability of human, *in vitro*, Guggenberger, J., (Abst.), 249
 Spillman, R., The application of x-ray to obstetrics and gynecology, (Collective Review), 110
 Stein, (with Arens), Roentgenograms of the fetal skeleton as a positive sign of pregnancy, (Abst.), 502
 Steinberg, B., The use of pituitary extract in labor, 82
 Steinhäuser, W., The biological behavior of spermatozoa to contraceptive substances, (Abst.), 250
 Sterility and x-rays, Belot, J., (Abst.), 251
 correction of, Maier, (Abst.), 247
 defective diet as a cause of, final report of fertility studies in the Albino rat, Macomber, D., (Abst.), 244
 in female, causes and treatment of, Winter, (Abst.), 245
 in women and the outlook of its treatment, Schmidt, H. R., (Abst.), 247
 in women, the treatment of, Graff, (Abst.), 248
 primary, Rongy, (Abst.), 246
 the x-ray as treatment for, Linzenmeier, (Abst.), 249
 with reference to the State, Gibbons, (Abst.), 243
 Sterilization of the mentally unfit, Emerick, (Abst.), 252

- Stickel, (with Zondek), Clinical investigations of the value of organotherapy in ovarian hemorrhages, (Abst.), 752
- Streeker, J., Disturbances in the third stage of labor, (Abst.), 119
- Strube, Is morphia an antidote in scopolamine poisoning? (Abst.), 365
- Sutton, L. A., Ovarian pregnancy, with the report of a case, 1

T

- Tate, M. A., Carcinoma of base of appendix, report of a case of, 291, 325
- Taylor, (with Aub), The effect of body tissues other than the thyroid upon the basal metabolic rate, (Abst.), 748
- TeLinde, Richard W., (with Novak, Emil), The pathological anatomy of the corpus luteum, (abscess, cyst, hematoma, and neoplasm), (Abst.), 749
- Titus, P., (with Andrews, V. L.), (1) Frozen sections through uterus of woman dying during third stage of labor, illustrating mechanism of placental separation and extrusion. (2) Frozen sections through uterus of woman dying from central placenta previa, following Braxton-Hicks version, 396, 478
- Toxemia of pregnancy, a statistical review of the, Bunzel, E. Everett, 686, 730
- Turner, Henry H., (with Speidel, Edward), The roentgen ray diagnosis of normal and abnormal pregnancies, 697, 719
- Tuttle, H. K., The value of certain gynecological operations, 43
- Tweedy, The treatment of antepartum hemorrhage, (Abst.), 119

U

- Uterine hemorrhage, the action of the lutein cells of the ovary in certain, DeRouville and Sappey, (Abst.), 745
- secretion, a brief investigation of its nature in the human being, Kross, I., 319
- Uterus, adenocarcinoma of the body of the, report of a case of, Horsley, J. S., Jr., 166
- carcinoma of the, Crile, G. W., 525
- the rôle of radium in the treatment of, Jones, T. E., 511
- the body of the, with the report of 115 cases, Norris and Vogt, 550, 625

Uterus—Cont'd

- difficulties in the diagnosis of rupture of the, Keller, R., (Abst.), 122
- inversion of the, Faust, (Abst.), 123
- lesions of the cervical stump of a supravaginally ablated, Reder, F., 173, 218
- puerperal, prolapse of the spontaneously inverted, Philips, (Abst.), 123
- radiation therapy of cancer of the, Portmann, U. V., 533
- report of two cases of acute inversion of the, Manton, (Abst.), 123
- rupture of the, consideration of some cases of, Fleurent, H., (Abst.), 122
- ruptured, resulting from the use of pituitary extract, report of a case of, Dorland, (Abst.), 122
- symposium on the relative rôle of surgery, x-ray and radium in the treatment of carcinoma of the, Crile, Portmann and Jones, 611
- torsion of the, during labor, Weinsierl, E., (Abst.), 121
- two cases of inversion of the, Hawkins, W. H., 331

V

- Vagina, chronic ulcer of, of undetermined origin, Kross, I., 103
- Van Blomestein, Rectal examination during labor, (Abst.), 114
- Van der Perk, Acute dilatation of the stomach after labor, (Abst.), 121
- Vander Veer, E. A., Septic infections following childbirth, or an analysis of maternity mortality considered from the standpoint of increase of death among mothers, 280, 326
- Vermelin, Dissociation of the membranes, (Abst.), 116
- Vignes, The sedimentation of red blood cells in pregnant women, (Abst.), 501
- Vineberg, H. N., A case of interstitial ectopic gestation with unusual symptoms, 228
- Vogt, E., New facts and problems in sperm immunity, (Abst.), 249
- Vogt, M. E., (with Norris, C. C.), Carcinoma of the body of the uterus, with report of 115 cases, 550, 625
- Volpe, C., Reactions to extracts of the posterior pituitary in pregnancy, (Abst.), 746
- Vulva, a case of obstinate diabetic eczema of, rapid cure by insulin administration, with return of menstruation at fifty, Dickinson, R. L., 338

W

- Wachs, Charles, (with Hirst, J. C.), Labor injuries to the coccyx and their treatment, 199
- Wiener, Herbert J., Diabetes mellitus in pregnancy, 710
- Weinsierl, E., Torsion of the uterus during labor, (Abst.), 121
- Welton, T. S., The time for operation in ectopic gestation, 158, 213
- Wijsenbeck, Is early rupture of the membrane desirable? (Abst.), 115
- Williamson, Herbert, The pituitary gland in its relation to obstetrics and gynecology, (Abst.), 746
- Willits, P. W., (with Campbell, A. M.), Report of a case of anencephaly,—diagnosis before onset of labor, 104
- Willmore, Clinical observations on adhesion and retention of the membranes, (Abst.), 116
- Winans, Some indications for therapeutic abortion and sterilization, (Abst.), 252

- Winter, Causes and treatment of sterility in the female, (Abst.), 245
- Wolfe, S. A., Intrapartum and postpartum streptococcus septicemia of extrapelvic origin, 97
- Wound union, an analysis of, in 3000 abdominal incisions from the clinic of the Woman's Hospital, Goff, B. II., 342

Z

- Zangemeister, Retention of placental rests at full term delivery, (Abst.), 120
- Zarate, E., The necessity of uniformity in the nomenclature of uterine dystocia, (Abst.), 117
- Zimmermann, Aims and limitations of local anesthesia in operative gynecology, (Abst.), 368
- Zondek, Experimental investigations of the value of organotherapy, (Abst.), 753
(with Stickel), Clinical investigations of the value of organotherapy in ovarian hemorrhages, (Abst.), 752

The American Journal of Obstetrics and Gynecology

GEORGE W. KOSMAK, M.D., Editor HUGO EHRENFEST, M.D., Associate Editor

Published by THE C. V. MOSBY COMPANY, 508 North Grand Blvd., St. Louis, Mo.

Published Monthly. Subscriptions may begin at any time.

Editorial Communications

Original Contributions.—Contributions, letters, and all other communications relating to the editorial management of the Journal should be sent to Dr. George W. Kosmak, 23 East 93d Street, New York.

All articles published in this Journal must be contributed to it exclusively. If subsequently printed elsewhere (except in a volume of Society Transactions) due credit shall be given for original publication. The editor relies on all contributors conforming strictly to this rule.

Neither the editor nor the publisher accepts responsibility for the views and statements of authors as published in their "Original Communications."

Translations.—The Journal will be pleased to receive, and to translate contributions by Continental authors if on examination they prove desirable.

Illustrations.—A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editor for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered only in India ink, or black typewriter ribbon (when the typewriter is used), as ordinary blue ink or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

Exchanges.—Contributions, letters, exchanges, reprints, and all other communications relating to the Abstract Department of the Journal should be sent to Dr. Hugo Ehrenfest, 712 Metropolitan Building, St. Louis, Mo. Writers on gynecological subjects are requested to place this address on their regular mailing list for reprints.

Reprints.—Reprints of articles published among "Original Communications," may be ordered specifically, in separate communication to the Publishers, The C. V. Mosby Co., 508 North Grand Blvd., St. Louis, U. S. A., who will send their schedule of prices.

Review of Books.—Publishers and Authors are informed that the space of the Journal is so fully occupied by matter pertaining to the branches to which it is devoted, that only works treating of these subjects can be noticed. Books and monographs, native and foreign, on Obstetrics, Gynecology and Abdominal Surgery will be reviewed according to their merits, and space at disposal. Send books to Dr. Hugo Ehrenfest, Assoc. Editor, Metropolitan Bldg., St. Louis, U. S. A.

Business Communications

Business Communications.—All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 508 North Grand Blvd., St. Louis, Mo.

Subscription Rates.—Single copies, 75c. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, \$6.00 per year in advance. To Canada and under foreign postage, \$6.40. Includes two volumes a year, January and July.

Remittances.—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter, payable to the publishers, The C. V. Mosby Co.

Change of Address.—The publishers should be advised of change of subscriber's address about fifteen days before the date of issue, with both new and old addresses given.

Nonreceipt of Copies.—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Advertisements.—The advertising policy of the Journal will conform to the standards set by the Council of Pharmacy and Chemistry of the American Medical Association. Only articles of known scientific value will be given space. Terms close first of month preceding date of issue. Advertising rates and page sizes on application.

